Cryptologic Technician Training Series

Module 11—CTM Organization and Administration

The terms training manual (TRAMAN) and nonresident training course (NRTC) are now the terms used to describe Navy nonresident training program materials. Specifically, a TRAMAN includes a rate training manual (RTM), officer text (OT), single subject training manual (SSTM), or modular single or multiple subject training manual (MODULE). An NRTC includes nonresident career course (NRCC), officer correspondence course (OCC), enlisted correspondence course (ECC), or combination thereof.

Although the words "he," "him," and "his" are used sparingly in this manual to enhance communication, they are not intended to be gender driven nor to affront or discriminate against anyone reading this text.

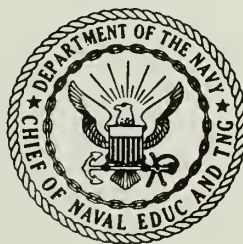# Naval Education And Training Program Management Support Activity

CRYPTOLOGIC TECHNICIAN TRAINING SERIES

MODULE 11
CTM ORGANIZATION
AND ADMINISTRATION

NAVEDTRA A95-11-44-88

1988 Edition Prepared by
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PREFACE

This Training Manual (TRAMAN) and Nonresident Training Course (NRTC) form a self-study package designed to enable you to prepare for advancement to Cryptologic Technician Maintenance Third Class (CTM3). Satisfactory completion of the NRTC is necessary for advancement to Petty Officer Third Class (PO3). The NRTC includes learning objectives and supporting questions to lead you through the TRAMAN. Instructions for completing the NRTC are in the back of this manual, following the index.

This TRAMAN and NRTC publication was prepared by the Naval Education and Training Program Management Support Activity, Pensacola, Florida, for the Chief of Naval Education and Training. Technical assistance from fellow CTMs at Naval Security Group Activity, Sebana Seca, and Naval Security Group Activity, Groton, was greatly appreciated.

1988 Edition

THE UNITED STATES NAVY

GUARDIAN OF OUR COUNTRY

The United States Navy is responsible for maintaining control of the sea and is a ready force on watch at home and overseas, capable of strong action to preserve the peace or of instant offensive action to win in war.

It is upon the maintenance of this control that our country's glorious future depends; the United States Navy exists to make it so.

WE SERVE WITH HONOR

Tradition, valor, and victory are the Navy's heritage from the past. To these may be added dedication, discipline, and vigilance as the watchwords of the present and the future.

At home or on distant stations, we serve with pride, confident in the respect of our country, our shipmates, and our families.

Our responsibilities sober us; our adversities strengthen us.

Service to God and Country is our special privilege. We serve with honor.

THE FUTURE OF THE NAVY

The Navy will always employ new weapons, new techniques, and greater power to protect and defend the United States on the sea, under the sea, and in the air.

Now and in the future, control of the sea gives the United States her greatest advantage for the maintenance of peace and for victory in war.

Mobility, surprise, dispersal, and offensive power are the keynotes of the new Navy. The roots of the Navy lie in a strong belief in the future, in continued dedication to our tasks, and in reflection on our heritage from the past.

Never have our opportunities and our responsibilities been greater.

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MODULE 11

CTM ORGANIZATION AND ADMINISTRATION

Your services as a Cryptologic Technician Maintenance (CTM) are always in demand. Your extensive training, tremendous knowledge, and incessant desire to excel will be welcomed wherever you serve. To gain the increased level of authority and responsibility that advancement in rate provides, you must constantly strive to enhance your knowledge and hone your skills.

TOPICS IN THIS MODULE

This module contains the four topics listed in the table of contents. These topics will enhance your knowledge of the *Navy's advancement system*, *electrical and electronic maintenance reference publications*, *Navy directives*, and *drawings and blueprints*.

CTM3 OCCUPATIONAL STANDARDS COVERAGE

This Cryptologic Training Series module is the first of seven modules that will support the list of CTM3 Occupational Standards in your Cryptologic Technician Maintenance (CTM) *Advancement Handbook For Petty Officers*, NAVEDTRA 71577. The remaining six modules are not yet developed, but will become progressively available between now and 1991.

The four topics in this module partially support the nine CTM3 Occupational Standards (OCCSTDs) listed in the table below. They are from the list of CTM3 occupational standards in effect as of January 1989.

OCCSTDS describe the minimum duties and responsibilities for enlisted personnel within each rate and rating. They also form the basis of your Personnel Advancement Requirements (PARs), which must be completed before you can be recommended for advancement to CTM3.

The CTM OCCSTDs are revised periodically to keep pace with any changes in the CTM's job. You can find the current CTM OCCSTDS in the latest edition of the *Manual of Navy Enlisted Manpower and Personnel Classifications and Occupational Standards*, NAVPERS 18068. They are also printed each year in the CTM *Advancemenent Handbook for Petty Officers*. This handbook also contains the PAR sheets and the bibliography for advancement study. If you don't have a copy of the handbook, get one, and keep it up to date. Your supervisor or Educational Services Officer (ESO) can help you.

CTM3 OCCUPATIONAL STANDARDS SUPPORTED BY THIS MODULE

NUMBER	OCCUPATIONAL STANDARD	TOPIC
68 GENERAL ADMINISTRATION		
68024	MAINTAIN PUBLICATIONS	2
68047	USE BULLETINS	2
68048	USE INSTRUCTIONS	3
68049	USE PUBLICATIONS	2
69 TECHNICAL ADMINISTRATION		
69065	USE BLUEPRINTS	4
69068	USE DIAGRAMS	4
69069	USE DIRECTIVES	3
69070	USE DRAWINGS	4
69073	USE SCHEMATICS	4

TOPIC 1

THE CRYPTOLOGIC TECHNICIAN MAINTENANCE (CTM) BRANCH

TOPIC OVERVIEW

This topic briefly describes the Navy enlisted rating and classification structures, the Cryptologic Technician (CT) rating, and the organization of the CTM branch. Following is an outline of the topic:

1. **ENLISTED RATING STRUCTURE**

   This section gives a brief description of the Navy's enlisted rating structure.

2. **NAVY ENLISTED CLASSIFICATION (NEC) STRUCTURE**

   Gives a brief description of the Navy's NEC structure.

3. **CRYPTOLOGIC TECHNICIAN (CT) RATING**

   Describes the overall CT rating and each of its six branches (CTA, CTI, CTO, CTR, CTT, and CTM).

4. **ADVANCEMENT STUDY FOR CRYPTOLOGIC TECHNICIANS**

   Covers the CT bibliographies for advancement study in NAVEDTRA 10052, *Bibliography for Advancement Study*, and the available correspondence courses listed in NAVEDTRA 10061, *List of Training Manuals and Correspondence Courses*.

5. **CTM ORGANIZATION**

   Covers the organization of a typical NAVSECGRU electronics maintenance department.

6. **GENERAL ADMINISTRATIVE DUTIES PERFORMED BY CTMs**

   Covers administrative support duties involving the use of office machines, desktop computers, files, and records.

ENLISTED RATING STRUCTURE

The present enlisted rating structure, established in 1957, includes three types of ratings for classifying personnel into occupational fields. They are (1) *general ratings*, (2) *service ratings*, and (3) *emergency ratings*.

1. *General ratings* identify broad occupational fields of related duties and functions. Some general ratings include service ratings; others do not. Both Regular Navy and Naval Reserve personnel may hold general ratings. The Cryptologic Technician (CT) is a general rating.

2. *Service ratings* identify subdivisions or specialties within a general rating. Although service ratings can exist at any petty officer level, they are most common at the PO3 and PO2 levels. Both Regular Navy and Naval Reserve personnel may hold service ratings. CTM, CTA, CTT, CTO, CTR, and CTI are service ratings within the general CT rating.

3. *Emergency ratings* identify civilian occupational fields used on active duty in time of war (for example, stevedore or transportationman). At present, all emergency ratings are disestablished.

NAVY ENLISTED CLASSIFICATION (NEC) STRUCTURE

The NEC structure supplements the enlisted rating structure by identifying personnel on active or inactive duty, and billets in manpower authorizations. NEC codes specify the need for personnel with special knowledges and skills when the rating structure alone is not enough for manpower management.

The NEC coding system helps manage Navy enlisted skills by identifying billets and personnel. It aids the efficient use, distribution, and detailing of personnel. When NECs require special training, the Navy uses an inventory of NEC-coded billets and personnel to plan assignments into appropriate courses. Thus, the enlisted strength of the Navy, primarily at the petty officer level, depends on the accuracy of NEC coding.

Some NECs require a formal training course; others are earned through On-the-Job Training (OJT). When you complete a formal course, the training facility automatically assigns the right NEC. This process allows faster NEC assignment and reduces paperwork at the command level. When you earn an NEC through OJT, the NEC is not automatically assigned. Therefore, commands must recommend fully qualified personnel for these NECs. The length of OJT is at the discretion of individual commanding officers. However, depending on the complexity of the NEC, 6 to 12 months is often considered minimum. Commanding officers must be sure that personnel being considered for an NEC have completed all listed NEC and component NEC requirements. Specific requirements for NECs are in NAVPERS 18068, *Navy Enlisted Manpower and Personnel Classification and Occupational Standards,*

section II, appendix C, under the appropriate NEC or NEC group heading.

CRYPTOLOGIC TECHNICIAN (CT) RATING

Before and during World War II, the jobs now performed by CTs were done by personnel selected from ratings such as Yeoman, Radioman, and Electronics Technician. Realizing that the work of Naval Security Group (NAVSECGRU) personnel required special skills and training, the Navy established the Communications Technician (CT) rating in 1948. This rating changed to the Cryptologic Technician (CT) rating in 1976. Together, with specially designated officers and warrant officers, CTs comprise the NAVSECGRU.

As the NAVSECGRU grew and became responsible for a wider variety of technical programs, the need for specialization within the CT rating became apparent. Thus, six separate branches evolved within the CT rating:

1. CTA Branch—Administrative

2. CTI Branch—Interpretive

3. CTO Branch—Communications

4. CTR Branch—Collection

5. CTT Branch—Technical

6. CTM Branch—Maintenance

Although the CT rating is a general rating, each of the six CT branches has its own, separate occupational qualifications. Thus, your advancement examinations will include knowledge and skills applicable to your particular branch. Of course, you must also be proficient in such subjects as security and organization of the Naval Security Group. These subjects are of equal importance to all CT branches.

CTs have varied and interesting duty tours. They may use their special skills on board Navy ships, aircraft, or shore bases located throughout the world. Wherever you work, you will learn that other Navy personnel rely on the accuracy and efficiency of your work. Attention to small details is of utmost importance, because all levels of government use the results of your work. One small omission or error might start a chain of events that could waste money or jeopardize the security of the nation.

CRYPTOLOGIC TECHNICIAN (ADMINISTRATIVE) (CTA)

CTA personnel perform a wide variety of administrative and clerical duties. They must have a thorough knowledge of the Navy and NAVSECGRU organizations. Also, CTA duties require a very close working relationship with

personnel assigned to the other branches of the CT rating. CTA personnel perform duties involving:

- Typing and filing.

- Operating office machines.

- Preparing, forwarding, and routing correspondence and reports.

- Maintaining records and publications.

- Requisitioning supplies.

CTAs must be thoroughly familiar with enlisted and officer service records, technical documents unique to the NAVSECGRU, and documents concerning personnel and physical security. The CTA must also know general office procedures, practices, and management.

CTAs could be assigned duty in any of the NAVSECGRU functional areas, such as communications, operations, maintenance, or administration. Additionally, they can be assigned to a Defense Courier Service (DCS) station or a Communications Security (COMSEC) Material Issuing Office (CMIO). The CTA Class "A" course at the Naval Technical Training Center, Pensacola, Florida, gives initial training to personnel entering the CTA rating.

CRYPTOLOGIC TECHNICIAN (INTERPRETIVE) (CTI)

CTI personnel prepare data and reports involving communications materials, as well as operating certain communications systems. CTIs must have a foreign language capability.

First, the CTI student attends a foreign language school. The length of this training varies from 7 to 15 months. After learning a foreign language, CTIs go to another school at Goodfellow Air Force Base, San Angelo, Texas. There they learn the operation of voice communications and tape-recording equipment. They also learn the fundamentals of code and cipher systems.

After their first tour of duty, CTI personnel may be eligible for advanced training in a number of skill areas or for training in a second foreign language.

CRYPTOLOGIC TECHNICIAN (COMMUNICATIONS) (CTO)

CTO personnel operate special-purpose teletypewriting equipment, office equipment, radio-receiving and -transmitting equipment, and cryptographic equipment. They perform duties in message centers around the world, ashore and afloat. CTOs provide rapid, reliable, and secure communications support for all levels of command. The sophisticated electronic, electromechanical, and Automated Data-Processing (ADP) equipment used

by CTOs is like that used by Radiomen assigned to communications centers ashore.

CTOs receive comprehensive technical training at the Naval Technical Training Center, Pensacola, Florida. While there, they learn the following:

- Basic electrical and electronic theory

- Electromagnetic wave-propagation theory and application

- Theory and operation of radio-transmitting and -receiving equipment

- Naval communications procedures

- Teletypewriter typing and operation

- Cryptographic equipment operation

- Communications center operations

For CTO personnel interested in additional technical training, there are opportunities for learning in modern, sophisticated, special-purpose communications systems and equipments.

CRYPTOLOGIC TECHNICIAN (COLLECTION) (CTR)

CTR personnel perform a variety of duties in connection with the operation of teletype and Morse communications systems. They receive training in the following subjects:

- Morse code and radio theory

- Typewriting

- Maintenance of certain CTR specific files and technical documents unique to the NAVSECGRU Command

They also learn to operate radio-receiving, direction-finding, teletype, and recording equipments. Opportunities for specialized training exist in such areas as signal security, computer operations and programming, message processing, and instructor training.

CTRs serve at various communications stations, NAVSECGRU activities, or communications security detachments located throughout the world. They are also assigned to detachments or departments aboard certain ships.

CRYPTOLOGIC TECHNICIAN (TECHNICAL) (CTT)

CTTs perform duties related to both communications and non-communications systems. Their duties are complex and require a high

degree of skill. They are among the most extensively trained personnel in the Navy.

During "A" school, CTTs learn to copy Morse code and operate magnetic tape recorders, computers, test equipment, receiving systems, and radioteletype equipment. They are also trained in electronics theory, radio-wave propagation, and the operation of systems associated with missiles, space vehicles, radar, and navigational aids.

CRYPTOLOGIC TECHNICIAN (MAINTENANCE) (CTM)

The field of electronics is always changing, offering new and challenging areas of interest almost every day. This makes the CTM rating an exciting and diversified rating.

CTMs maintain and calibrate standard and specialized electronic and electromechanical equipment used by NAVSECGRU activities throughout the world. CTMs are also called upon to install, maintain, and evaluate newly developed electronic communications equipment. Some CTMs maintain cryptographic devices when specifically trained and authorized to do so.

Because of the complexity of electronics equipment, the technician responsible for repairs must have extensive background knowledge of basic electricity and electronics. This includes a working knowledge of algebra, trigonometry, physics, and English.

CTMs provide maintenance service for NAVSECGRU activities throughout the world, both ashore and afloat. They perform preventive and corrective maintenance on

- radio receivers and antennas

- RF distribution equipment

- audio and dc distribution systems

- communications multiplexing and keying equipment

- cryptographic devices and teletypewriter equipment

- automated data-processing equipment

- electronic countermeasures equipment

Basic training for CTMs consists of formal schooling in fundamental electronics, part-replacement skills, and usage of electronic test equipment. A specialized maintenance course on one of the subsystems or equipments in current use follows basic training. As a CTM3, you will be responsible for maintaining one of these subsystems or equipments at peak efficiency, 24 hours a day, 365 days a year.

Your uppermost thought should be to perform your duties to the best of your ability. The mission of your duty station is vital to the defense of your country. Take pride in your work. Be sure to complete each task in the prescribed manner. Complete associated reports and records accurately and on time.

ADVANCEMENT STUDY FOR CRYPTOLOGIC TECHNICIANS

CT bibliographies for advancement study are in NAVEDTRA 10052, *Bibliography for Advancement Study*. This annual publication lists training manuals and other publications you should study when preparing for Navywide advancement examinations. These study materials are listed in the bibliography by rating and paygrade. An updated NAVEDTRA 10052 is published each year and distributed in the fall preceding the year it becomes effective.

In addition to NAVEDTRA 10052, a special bibliography for CTs is published at least 4 months before each examination cycle. This bibliography contains source material for a specific advancement examination series. It is a service unique to the CT community.

The importance of these bibliographies to the candidate cannot be overemphasized. If you carefully study all source material in the bibliograpy, you should get a higher examination score. If you get a higher examination score, you can get ahead in the Navy!

Another valuable source of study information available to the CTM is NAVEDTRA 10061, *List of Training Manuals and Correspondence Courses*. All ships and NAVSECGRU stations receive this publication. Your command's Educational Services Office (ESO) should have a current copy. The manual lists available training manuals and correspondence courses, and gives a brief overview of each. It also has chapters covering correspondence courses administered by the following activities:

- The Naval Education and Training Program Management Support Activity (NETPMSA).

- The Naval School of Health Sciences, National Naval Dental Center.

- The Naval War College.

- The Naval Security Group Division at the NETPMSA.

- The Air Force, Marine Corps, Army, and Coast Guard schools.

The chapter entitled *Naval Security Group Nonresident Training Materials* lists the available NAVSECGRU-related courses and gives information, eligibility, and enrollment procedures.
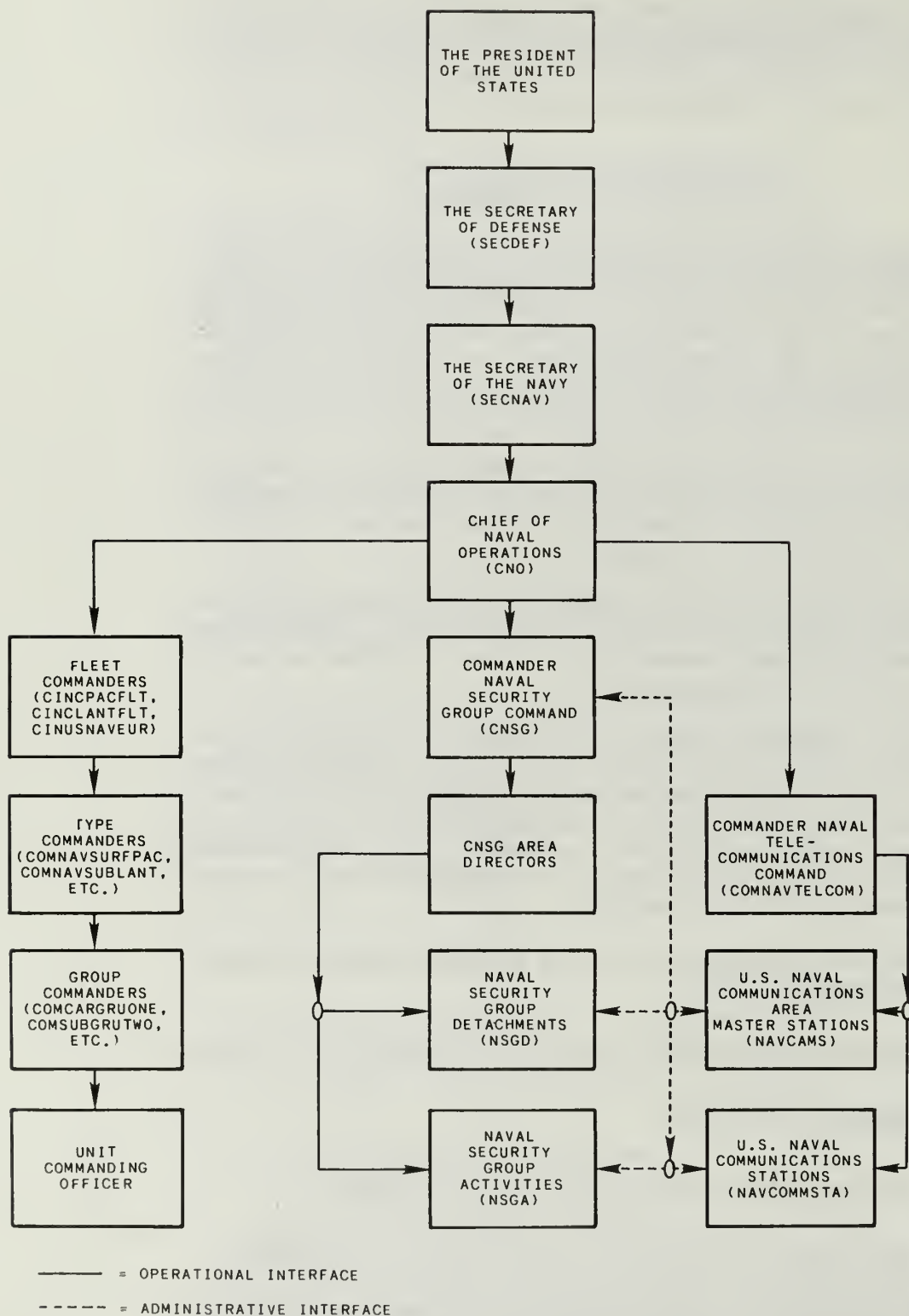
NOW is the time to prepare for advancement.

Figure 1-1.—Simplified Navy chain of command.

CTM ORGANIZATION

Look around you. You will notice that each person is working at an assigned task. A receiver is being calibrated, equipment is being prepared for shipment, or a group is gathered for training. Each person is assigned a task as part of a team. All in all, you will find that your duty station is a combination of highly skilled personnel organized into teams to carry out the mission of the command. It's important to understand your organization's structure from the top down, and how **you** fit into that structure.

NAVAL ORGANIZATION

Organization is the process by which

- jobs are divided into groups and assigned to individuals

- authority and responsibility are established

- relationships between individuals are decided

The Navy is organized into levels of authority to form a chain of command. Figure 1-1 shows the structure of this chain of command at the higher levels of authority. Figure 1-2 shows a typical chain of command from the commanding officer down to the various departments.

THE ELECTRONICS MAINTENANCE DEPARTMENT

Due to the difference in size and mission of NAVSECGRU activities, there is no standard organizational structure. Each command arranges its structure to best meet the needs of the mission.
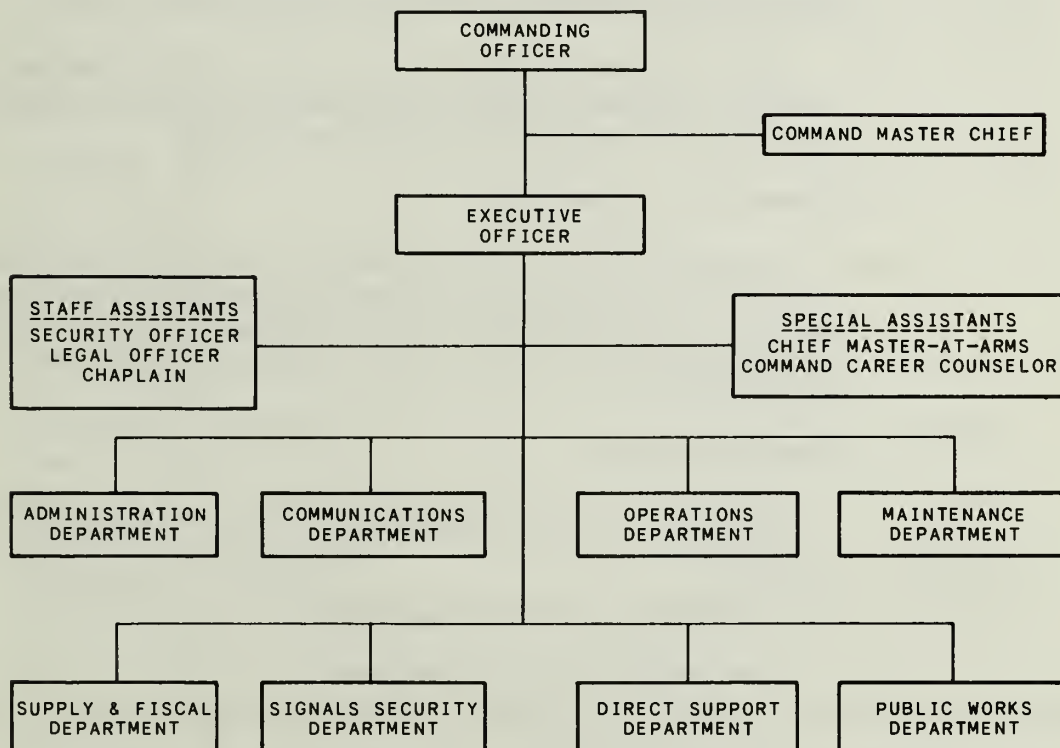
Figure 1-2.—Typical NAVSECGRU shore (field) activity chain of command.

This is especially true for electronic maintenance departments. Their organizational structure depends on the equipments installed, and the number of maintenance technicians assigned. Figure 1-3 shows the chain of command of a typical electronics maintenance department. At smaller commands, one person could fill two positions.

Electronics Material Officer (EMO)/Department Head

At most NAVSECGRU activities, the Electronics Material Officer and the Electronics Maintenance Department Head are the same person. As the EMO, this person is responsible for the following:

- Readiness of all assigned electronic equipment.

- Administration of the electronic material maintenance program.

- Technical maintenance and repair of electronic equipment.

- Installation of new or special electronic equipment.

- Administration of electronics supply stock.

As the Department Head, the EMO also is responsible for the conduct, training, welfare, and morale of the department's people.

Assistant Electronics Material Officer (AEMO)/Leading CTM

The department's AEMO/Leading CTM works directly with the EMO. This person is responsible for the proper performance of duties assigned to the various divisions of the electronics maintenance department.

Leading Chief Petty Officer (LCPO)/Division Chief

Each LCPO/Division Chief works directly with the AEMO and provides assistance in the administration of their division. The LCPO/Division Chief assigns specific duties to the Leading Petty Officer.

Leading Petty Officer (LPO)

Assigned by the LCPO/Division Chief, the LPO is an assistant to the LCPO/Division Chief and is the lead supervisor of division personnel. At smaller commands, the LPO may perform the duties of the LCPO/Division Chief. Specific duties of the LPO vary, based on the size of the division and the tasks at hand.

Division Personnel

Division personnel are assigned specific duties by their LPO. Examples of these are

- performing preventive maintenance

- performing corrective maintenance

- cleaning assignments

- administrative duties

Figure 1-3.—Typical NAVSECGRU shore (field) activity electronics maintenance department chain of command.

GENERAL ADMINISTRATIVE DUTIES
PERFORMED BY CTMs

Depending on the size of your division, and the amount of equipment maintained, you could be assigned an administrative position or perform administrative duties. These duties could involve a particular position, such as Supply Petty Officer, or they could be non-specific, such as maintaining a logbook. Whatever the case, you will be required to have a variety of skills. For instance, you must know how to use and care for office equipment, and how to maintain a filing system.

Office Machines and Desktop Computers
Used for Administrative Support

The two most common pieces of office equipment are typewriters and copy machines. These machines play an important part in administrative support. You must use and maintain these equipments properly. The best source of information on their use and care is in the manufacturer's instructions or technical manual.

General-purpose desktop computers are now being procured to aid administrative support. Such computers are used for word processing, data-base management, and spread-sheet analysis. You will use a desktop computer to report and manage maintenance actions under the NAVSECGRU Maintenance Management System (NMMS).

Files and Records

Files and records, properly maintained, provide a source of information for future reference. Examples of information to be stored would be messages on a specific subject or correspondence and documents for a particular project. If the information is to be of any use, it must be easy to locate when needed.

FILING SYSTEMS.—When information is stored in folders, a good filing system is necessary. The actual system of filing will depend on the needs of each division. When storing information in files, label each folder properly. If the information is classified material, mark the folder with the highest security classification of the material stored. Assign folders an appropriate subject code from SECNAVINST 5210.11 *Department of the Navy File Maintenance Procedures and Standard Subject Identification Codes (SSIC)*. The use of SSICs makes it easy to file folders of information into a usable filing system. When storing large amounts of material, use a cross-reference system of titles, subjects, and SSICs.

Folders are usually stored in four- or five-drawer, steel, letter-size, filing cabinets. The type of cabinet used must meet the security requirements for the classification of material being stored.

RECORD BOOKS AND LOGS.—Official records are kept in a record book or log. The format of the record or log will depend on the information to be recorded. When higher authority requires a record or log book, the format for the book is usually laid out by the higher authority. If **you** start a log book, begin by listing all the pertinent information to be recorded. Consider the information and how it should be listed. This is most easily accomplished by starting with key information used to reference each entry. Provide ample space for each entry and identify headings clearly.

SUMMARY

The Naval Security Group has some of the most technically advanced and skilled personnel in the Navy. As a CTM, you represent the cog of the NAVSECGRU wheel. It's up to you to provide the best maintenance support you can. To provide the best possible support, you must constantly strive to do better by enhancing your knowledge and honing your special skills. The rewards for this effort are advancement in rate, increased responsibility, recognition by superiors, and a personal feeling of accomplishment.

The CTM rating is ever changing and improving. We made every effort to provide current and accurate information in this module. But, as you may suspect, some of the information may be outdated by the time it reaches you. This is a continuing problem inherent in training material. Therefore, it is important that you consult the appropriate technical manuals and directives when actually performing your duties. Also, remember that the questions in the associated Nonresident Training Course (NRTC) for this module are based on information contained in the module. Do not base your answers to these questions on your own personal experiences oi other developments.

REFERENCES

Bibliography for Advancement Study, NAVEDTRA 10052-AH, Naval Education and Training Program Development Center, Pensacola, FL, 1986.

List of Training Manuals and Correspondence Courses, NAVEDTRA 10061-AS, Naval Education and Training Program Development Center, Pensacola, FL, 1986.

Ocean Systems Technician 3 & 2 (Maintainer), NAVEDTRA 062-05-45-82, Naval Education and Training Program Development Center, Pensacola, FL, 1986.

Department of the Navy File Maintenance Procedures and Standard Subject Identification Codes, SECNAVINST 5210.11, Chief of Naval Operations, Washington, DC, 13 August 1982.

TOPIC 2

ELECTRICAL AND ELECTRONICS REFERENCE PUBLICATIONS

TOPIC OVERVIEW

Electronics theory and electronics maintenance are subjects where there is no shortage of easily available reference material. Publications you will use include texts, handbooks, catalogs, lists, indexes, bulletins, instruction books, and technical manuals. This topic identifies and briefly describes the more common publications used by CTMs. Following is an outline of the topic:

1. **SECURITY OF CLASSIFIED INFORMATION PUBLICATIONS**

   Describes six important security-related publications you will use.

2. **SAFETY PUBLICATIONS**

   Describes four publications that are sources of information on safety as it applies to electronics maintenance.

3. **ELECTRICAL AND ELECTRONICS REFERENCE AND STUDY MATERIALS**

   Covers 10 commonly used electricity and electronics reference publications.

4. **MAINTENANCE ADMINISTRATION**

   Describes three reference publications that cover maintenance administration duties and responsibilities.

5. **CORRECTIONS AND CHANGES TO TECHNICAL PUBLICATIONS**

   Covers procedures for making corrections and changes to technical publications, making EIB and EIMB changes, and maintaining NAVSEA and NAVELEX technical manuals.

SECURITY OF CLASSIFIED INFORMATION PUBLICATIONS

The security of the United States, and of naval operations in particular, depends on how successfully we protect our classified information. Every individual has a legal and moral responsibility to maintain the security of any classified material to which they have access. As a CTM, you will work with classified equipment and use classified publications. All persons who use classified information must keep a common-sense outlook on security and know where to go for more information on security procedures. Security cannot be overemphasized. Security begins with you!

The following are important security-related publications you will use:

1. *Department of the Navy Information and Personnel Security Program Regulation*, OPNAVINST 5510.1
2. *Sensitive Compartmented Information (SCI) Security Manual, Administrative Security*, DOD C-5105.21-M-1
3. *Physical Security Standards for Sensitive Compartmented Information Facilities*, DIAM 50-3
4. *Security of Compartmented Computer Operations*, DIAM 50-4
5. *Sensitive Compartmented Information (SCI) Security and Emergency Destruction*, NSGTP 683-11-00-88
6. *Navy Implementation of National Policy on Control of Compromising Emanations*, OPNAVINST C5510.93

OPNAVINST 5510.1G

DEPARTMENT OF THE NAVY

INFORMATION AND PERSONNEL
SECURITY PROGRAM
REGULATION
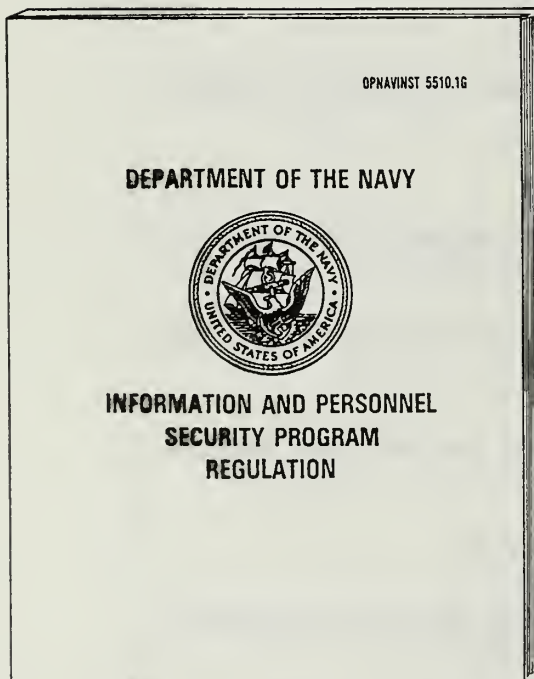
DEPARTMENT OF THE NAVY INFORMATION AND PERSONNEL SECURITY PROGRAM REGULATION, OPNAVINST 5510.1

This instruction is commonly referred to as the Navy's *Security Manual*. It issues the controlling policy for implementation and maintenance of the Navy's information and personnel security program. Its policy and procedures are the Navy's *minimum* requirements for safeguarding classified information. Commanding officers may choose to impose more stringent requirements within their own commands. Although this instruction deals with conventionally classified materials, it also applies to SCI as the basic standard for classification principles, markings, downgrading, and declassification actions. The correspondence course NAVEDTRA 10987, *Security Manager*, covers the contents of OPNAVINST 5510.1. We recommend you take this course to strengthen your knowledge of the Navy's program to protect classified information.

OPNAVINST 5510.1 contains four main parts:

Part I: *Personnel Management*
Part II: *Classification Management*
Part III: *Accounting and Control*
Part IV: *Personnel Security*

These four parts of the *Security Manual* cover Navy policy and procedures on the following subjects:

- Security education and training.

- Classification of official information.

- Individual responsibilities regarding stowage, accountability, disposition, and destruction.

- Transmission of classified material.

- Security violations and compromises.

- Control of discussion, disclosure, photography, reproduction, and visitors.

- Personal censorship.

- Communications security.

- Personnel security investigations and clearances.

SENSITIVE COMPARTMENTED INFORMATION (SCI) SECURITY MANUAL, ADMINISTRATIVE SECURITY, DOD C-5105.21-M-1

This manual is commonly referred to as the *M-1 Manual.* In it, the Director, Defense Intelligence Agency (DIA) prescribes general administrative policy and procedures for the security, use, and dissemination of SCI.
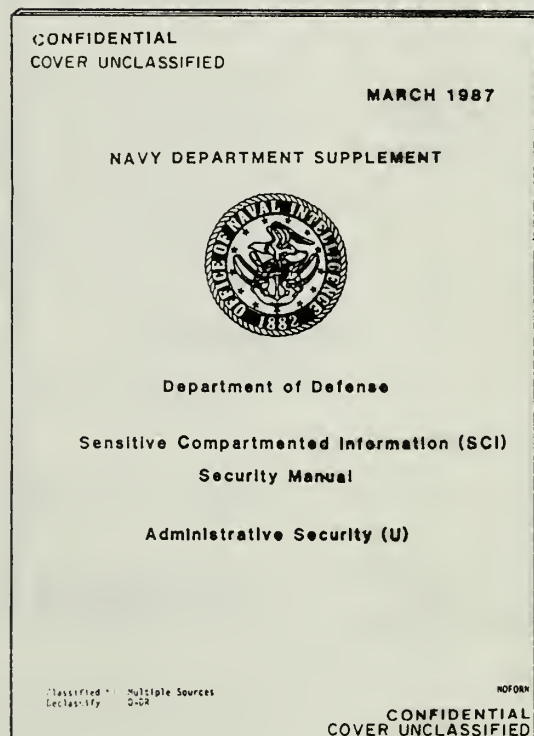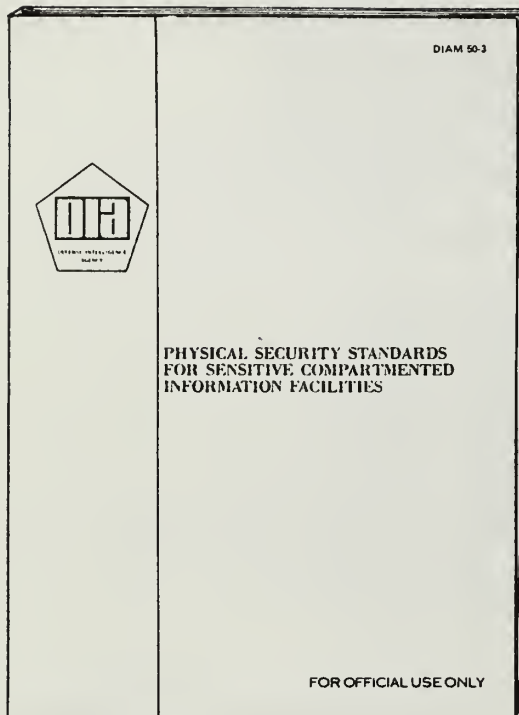
CONFIDENTIAL
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MARCH 1987

NAVY DEPARTMENT SUPPLEMENT

Department of Defense

Sensitive Compartmented Information (SCI)
Security Manual

Administrative Security (U)

Classified · Multiple Sources
Declassify   O-OR

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DIAM 50-3

PHYSICAL SECURITY STANDARDS
FOR SENSITIVE COMPARTMENTED
INFORMATION FACILITIES

FOR OFFICIAL USE ONLY

PHYSICAL SECURITY STANDARDS FOR SENSITIVE COMPARTMENTED INFORMATION FACILITIES, DIAM 50-3

DIAM 50-3 establishes the minimum standards for construction and protection of facilities that store and process Sensitive Compartmented Information (SCI). This manual gives the minimum standards for the following:

● Perimeter construction

● Intrusion detection systems

● Telephone and intercommunications equipment security

● Other miscellaneous physical security requirements

CONFIDENTIAL
COVER UNCLASSIFIED

DIAM 50 4
(REPRINTED SEPTEMBER 1983 FOR STOCK)

Security of Compartmented
Computer Operations (U)

COVER UNCLASSIFIED
CONFIDENTIAL

SECURITY OF COMPARTMENTED COMPUTER OPERATIONS, DIAM 50-4

DIAM 50-4 gives policy and security requirements for protecting SCI that is processed and stored in an Automatic Data-Processing (ADP) system. This manual also establishes the criteria and procedures for testing, analyzing, evaluating, and accrediting ADP systems and networks.

SENSITIVE COMPARTMENTED INFORMATION (SCI) SECURITY AND EMERGENCY DESTRUCTION, NSGTP 683-11-00-88

This publication provides you with supplemental training in the many facets of security and emergency destruction. You must complete this course for advancement to petty officer third class.

NAVY IMPLEMENTATION OF NATIONAL POLICY ON CONTROL OF COMPROMISING EMANATIONS, OPNAVINST C5510.93

This instruction implements the national policy on the control of Compromising Emanations (CE). CE, referred to as TEMPEST, are unintentional, information-bearing signals that, when intercepted and analyzed, can disclose classified information being transmitted, received, or otherwise processed by electrical equipment or systems. Any electrical information-processing device, whether it's an ordinary electric typewriter or a large computer, can emit interceptable CE.

SAFETY PUBLICATIONS

Nothing in the CTM training program is more important than your safety and the safety of fellow workers. In few other fields is the expression "carelessness kills" more appropriate.

Electronic equipments and circuits are potentially **DEADLY!** As you become more familiar with your job, you may become less cautious when operating or maintaining electronic equipment. The dangers of electrical shock, exposure to toxic or radioactive substances, or breakage of cathode ray tubes do not decrease with familiarity. Always be alert to the dangers that exist. Constantly apply and review basic safety precautions. The following publications are sources of information on safety as it applies to electronics maintenance.

1. *NAVSECGRU Logistics Management Manual*, NAVSECGRUINST 4000.1

2. *Naval Ships' Technical Manual*, Chapter 400, *Electronics*, NAVSEA S9086-ND-STM-000/CH-400

3. *Electronic Installation Maintenance Book (EIMB), General*, NAVSEA SE000-00-EIM-0100

4. *Naval Electronics Systems Engineering Activity (NESEA) Electronic Safety Handbook*, EO410-AA-HBK-010/00K
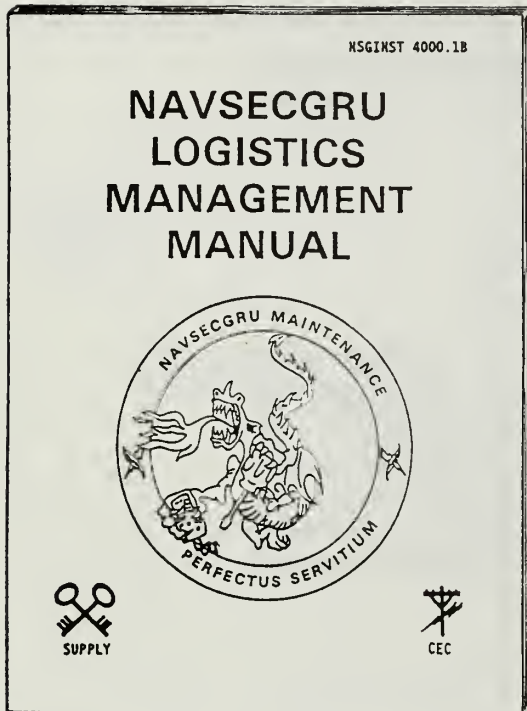
NAVSECGRU LOGISTICS MANAGEMENT MANUAL, NAVSECGRUINST 4000.1

Chapter 10 of this instruction gives detailed information on electronic and electrical safety for CTMs. This a publication that you'll use on a daily basis.

NSGIKST 4000.1B

NAVSECGRU LOGISTICS MANAGEMENT MANUAL

SUPPLY

CEC
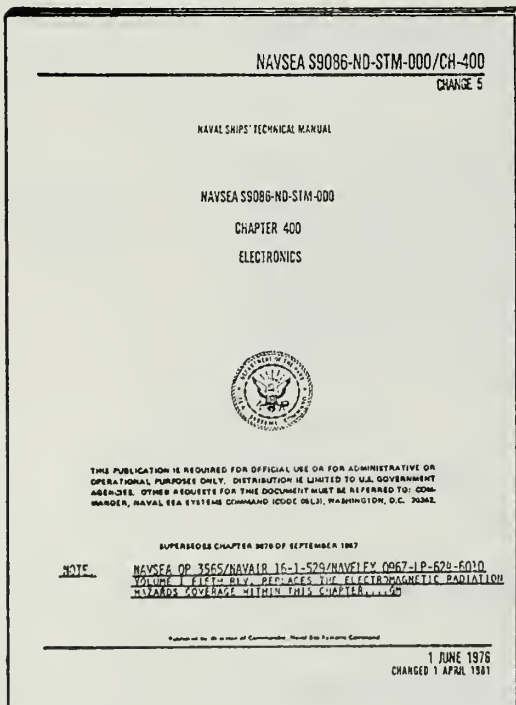
NAVAL SHIPS' TECHNICAL MANUAL, CHAPTER 400, ELECTRONICS, NAVSEA S9086-ND-STM-000/CH-400

This manual gives major Naval Sea Systems Command (NAVSEASYSCOM) procedures for the handling of electronic material under its technical control. Section V, *Safety*, gives safety precautions that you should observe.

NAVSEA S9086-ND-STM-000/CH-400
CHANGE 5

NAVAL SHIPS' TECHNICAL MANUAL

NAVSEA S9086-ND-STM-000

CHAPTER 400

ELECTRONICS

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SUPERSEDES CHAPTER 9670 OF SEPTEMBER 1967

NOTE   NAVSEA OP 3565/NAVAIR 16-1-529/NAVELEX 0967-1P-624-6010 VOLUME I FIFTH RLY, REPLACES THE ELECTROMAGNETIC RADIATION HAZARDS COVERAGE WITHIN THIS CHAPTER....GO

1 JUNE 1976
CHANGED 1 APRIL 1981

ELECTRONICS INSTALLATION AND MAINTENANCE BOOK, GENERAL, NAVSEA SE000-00-EIM-100

Section 3 of this handbook is a quick source of information for preventing or eliminating hazards to personnel ashore and afloat. It gives responsibilities and recommended precautions and practices associated with the following:

- Electrical shock

- Shipboard ungrounded electrical distribution systems

- Handling and charging of batteries

- Non-portable power tools and equipment

- Portable power tools and equipment

- Soldering irons

- Hazardous equipment and materials

- Electromagnetic radiation

- Electrical fires

- Safety equipment

- Cold-weather operations

- Warning signs and posters that are necessary where potential hazards exist

NAVSEA SE000-00-EIM-100

ELECTRONICS
INSTALLATION
AND
MAINTENANCE BOOK

GENERAL

Published by direction of
COMMANDER, NAVAL SEA SYSTEMS COMMAND

APRIL 1983

FOR OFFICIAL USE ONLY

ELECTRONIC SAFETY HANDBOOK, E0410-AA-HBK-010/00K

You should have your own personal copy of this handbook. It's published by the Naval Electronic Systems Command. And, it's primarily written to help you get "squared away" on what's safe and what's unsafe. Instead of containing detailed safety procedures, this handbook is a well-illustrated, easy-to-read source of information.

E0410-AA-HBK-010/00K ELEXSAFE

electronic
SAFETY
handbook

NAVAL ELECTRONIC SYSTEMS COMMAND
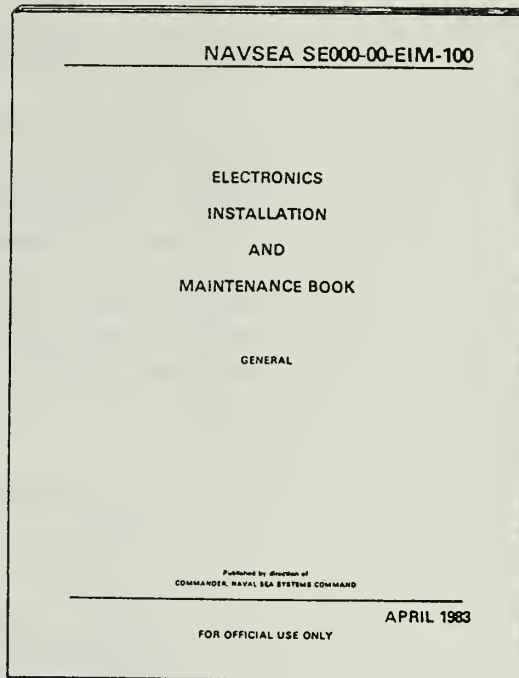
ELECTRICAL AND ELECTRONICS
REFERENCE AND STUDY MATERIALS

Your need for electrical and electronics reference material doesn't end the day you complete "A" school; it just begins. Whether it be for trouble-shooting a receiver, calibrating test equipment, or studying for advancement to the next paygrade, you will be using reference materials.

There's an unlimited supply of electrical and electronics reference material available. Knowing what publications are available, which are important to you, and where to find them can be frustrating. Your success as a CTM will largely depend on "knowing where to find it." Be curious; look through your technical library; see what publications are there.

Following are some of the more common reference publications you will use:

1. *Navy Electricity and Electronics Training Series* (NEETS)
2. *Electronics Installation and Maintenance Book* (EIMB)
3. *Naval Shore Electronics Criteria Handbooks*, NAVELEX SERIES 0101,100
4. *Digital Computer Basics*, NAVEDTRA 10088
5. Equipment Technical Manuals
6. *Engineering Information Bulletin* (EIB), NAVSEA 0967-LP-001-3XX
7. *Naval Security Group Tech Notes*
8. *Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Capability and Safety*, MIL-STD-1310(NAVY)
9. *Installation Criteria For Shipboard Secure Electrical Information Processing Systems*, MIL-STD-1680(SHIPS)
10. *Metrology Automated System for Uniform Recall and Reporting (MEASURE) Users Manual*, OP 43P6A

NAVY ELECTRICITY AND ELECTRONICS TRAINING SERIES (NEETS)

Written and edited by senior electrical and electronics technicians, this 21-module, self-study series provides beginners with basic electrical and electronics theory. Its topics range from the history of electricity to the principles of radar and beyond.

When all modules of the series are completed, the NEETS will replace volumes 1 and 2 of NAVEDTRAs 10087-C and 10087-C1, *Basic Electronics*, and their respective correspondence courses.

List of the NEETS by Module Title

The following is a list of the NEETS by module title. If you are just learning electricity and electronics, you should study the modules in sequence.

Module 1, *Introduction to Matter, Energy, and Direct Current*
Module 2, *Introduction to Alternating Current and Transformers*
Module 3, *Introduction to Circuit Protection, Control, and Measurement*
Module 4, *Introduction to Electrical Conductors, Wiring Techniques, and Schematic Reading*
Module 5, *Introduction to Generators and Motors*
Module 6, *Introduction to Electronic Emission, Tubes, and Power Supplies*
Module 7, *Introduction to Solid-State Devices and Power Supplies*

Overview of the NEETS Modules

Module 1 begins with a short history of electricity and electronics, and proceeds into matter, energy, and direct current. It also gives general safety precautions and first-aid procedures that should be common knowledge for anyone working with electricity. (There are safety hints included throughout the series.) Modules 2 through 5 deal with the generation of electricity, and the application of resistors, capacitors, and inductors. Module 6 ties the first five modules together in an introduction to vacuum tubes and the vacuum tube power supply. Module 7 does the same thing, using solid-state devices.

Module 8 continues the series with an introduction to amplifiers. Module 9 introduces you to wave-generation and wave-shaping circuits. Module 10 discusses the characteristics of wave propagation, transmission lines, and antennas. Module 11 covers microwave oscillators, amplifiers, and waveguides. Module 12 covers modulation principles.

Module 13 introduces numbering systems, Boolean algebra, and logic circuits. Module 14 covers microelectronics technology and the repair of miniature and microminiature circuits. Module 15 covers the operation and application of synchro, servo, and gyro mechanisms.

Module 16 introduces you to some of the commonly used test equipments and covers their basic application. Module 17 presents the fundamentals of a Radio-Frequency (RF) communications system. Module 18 covers the fundamentals of radar principles.

Module 19 provides you with a handy reference of commonly used general information, such as electrical and electronics formulas, color-coding schemes, and Navy supply system information. Module 20 is the glossary of electrical and electronics terms used throughout the series. Module 21 provides you with information on the basics of test methods and practices.

There are plans to publish a Module 22 and a Module 23. These will introduce modern mainframe and personal computers, associated peripherals, and software.

Each module has review questions. Answers to the questions are at the bottom of the next even-numbered page.

Developers of the NEETS made every attempt to use simple language. Technical words or phrases are explained both in the text and in the glossary at the end of each module. Module 20 also defines specific electrical and electronics terms.

All modules use numerous illustrations and explain circuit theory in simple mathematical terms. A basic knowledge of algebra will help you to better understand the formulas used.

Each of the modules includes a Nonresident Training Course (NRTC), except for Module 19, *The Technician's Handbook*, and Module 20, *Master Glossary and Index*. NAVEDTRA 10061, *List of Training Manuals and Correspondence Courses*, gives course descriptions and ordering procedures.

ELECTRONICS INSTALLATION AND MAINTENANCE HANDBOOKS (EIMBs)

The EIMB is one of the more common references. It is used worldwide by both military and civilian technicians as a standard source for information and guidance on installation, maintenance, and repair of electronics equipment. The EIMB makes available, in one source document, the maintenance, repair, and material readiness policies issued in chapter 400 of the *Naval Ships' Technical Manual*. It also includes other electronics-related information normally found in textbooks, periodicals, or technical papers.

Periodic revisions to the EIMB keep its content current. These revisions come from such sources as the *Engineering Information Bulletin* (EIB), the *NAVSEA Journal*, textbooks, industry magazines, periodicals, and other military installation and maintenance-related publications.

The EIMB handbooks are divided into two main categories: *general information handbooks* and *equipment-oriented handbooks*. General information handbooks contain data for personnel involved in general installation and maintenance of equipment, regardless of equipment specialty. Equipment-oriented handbooks contain data on general test procedures, adjustments, servicing, and field change identification on equipment of a particular class.

General Information EIMB Handbooks

There are seven general information handbooks in the EIMB series:
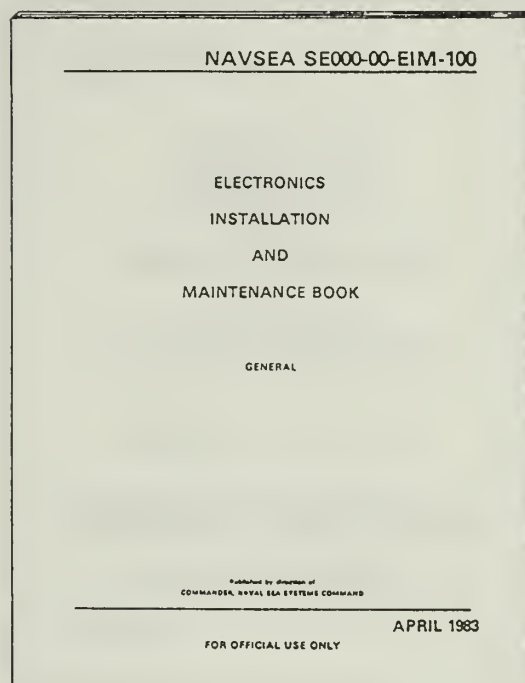
1. *General*, NAVSEA SE000-00-EIM-100
2. *Installation Standards*, NAVSEA SE000-00-EIM-110
3. *Electronic Circuits*, NAVSEA SE000-00-EIM-120
4. *Test Methods and Practices*, NAVSEA SE000-00-EIM-130
5. *Reference Data*, NAVSEA SE000-00-EIM-140
6. *EMI Reduction*, NAVSEA SE000-00-EIM-150
7. *General Maintenance*, NAVSEA SE000-00-EIM-160

GENERAL, NAVSEA SE000-00-EIM-100.—This EIMB handbook gives you policy and instructions for use of the EIMB series. It also gives informal guidance for installing, maintaining, and repairing electronic equipment. It has five sections:

Section

1	*Introduction*
2	*Administration*
3	*Safety and Accident Prevention*
4	*Publications and Their Handling*
5	*EIB/EIMB Indexes*

Index C of Section 5, the *EIMB Subject Index*, is a handy reference for finding which of the other six EIMB handbooks contains information on a particular subject.

NAVSEA SE000-00-EIM-100

ELECTRONICS

INSTALLATION

AND

MAINTENANCE BOOK

GENERAL

Published by direction of
COMMANDER, NAVAL SEA SYSTEMS COMMAND

APRIL 1983

FOR OFFICIAL USE ONLY

INSTALLATION STANDARDS, NAVSEA SE000-00-EIM-110.—This EIMB handbook contains approved shipboard standards, techniques, and practices for installing electronic equipment. It covers all phases of installation—from the receipt of equipment through the actual installation. This information was extracted from numerous publications, instructions, and pamphlets from military and civilian sources. The handbook is revised periodically to include the latest techniques and developments.

The handbook has 6 sections:

Section

1	*General*
2	*Cable, Flexible, and Semi-Rigid*
3	*Support Equipment*
4	*Antennas*
5	*Waveguide and Rigid Coaxial Lines*
6	*Equipment Installation*

NAVSEA 0967-LP-000-0110

ELECTRONICS

INSTALLATION

AND

MAINTENANCE BOOK

INSTALLATION

STANDARDS

Published by direction of
COMMANDER, NAVAL SEA SYSTEMS COMMAND

FOR OFFICIAL USE ONLY

1 SEPT. 1977

NAVSEA 0967-LP-000-0120
W/CHG 1

ELECTRONICS
INSTALLATION
AND
MAINTENANCE BOOK

ELECTRONIC CIRCUITS

PUBLISHED BY DIRECTION OF
COMMANDER, NAVEL SEA SYSTEMS COMMAND

PUBLISHED: DECEMBER 1972
CHANGE 1: MARCH 1980

ELECTRONICS CIRCUITS, **NAVSEA SE000-00-EIM-120.**—This EIMB handbook is an informative reference on electronics circuitry. It describes characteristics, application, theory, and failure analysis of circuits used in all types of electronics equipment. It is periodically updated to add new circuits or to revise existing circuits, based on current electronics developments.

The handbook has 16 sections:

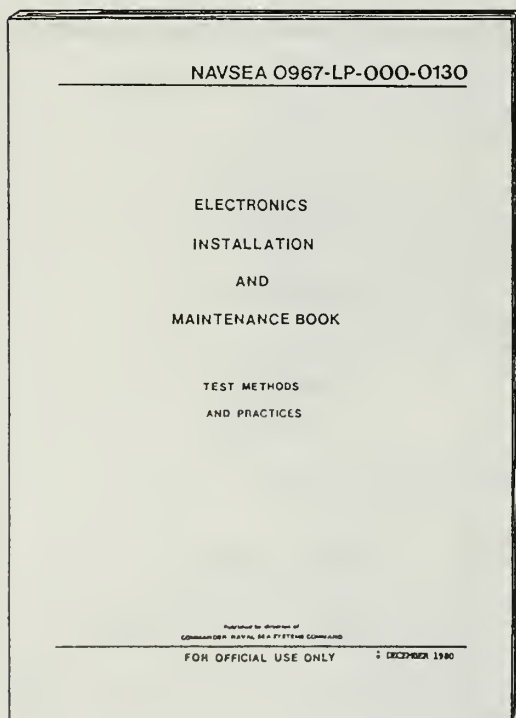| Section		Section	
1	*Introduction*	10	*Detectors*
2	*Power Supplies*	11	*Mixing, Heterodyning,*
3	*Voltage Regulators*		*and Automatic*
4	*Filters*		*Conrol Circuits*
5	*Amplifiers*	12	*Modulators*
6	*Oscillators*	13	*Special Circuits*
7	*Multivibrators*	14	*Synchros and Servos*
8	*Sweep Generators*	15	*Counters*
9	*Cathode Ray Tube Circuits*	16	*Logic Circuits*

NAVSEA O967-LP-OOO-O13O

ELECTRONICS

INSTALLATION

AND

MAINTENANCE BOOK

TEST METHODS

AND PRACTICES

Published by direction of
COMMANDER NAVAL SEA SYSTEMS COMMAND

FOR OFFICIAL USE ONLY   DECEMBER 1980

TEST METHODS AND PRACTICES, **NAVSEA SE000-00-EIM-130.**—This EIMB handbook has the information you'll need to properly test electronic equipment. It describes the basic functions of general test equipment, and outlines testing techniques and practices.

The handbook has 6 sections:
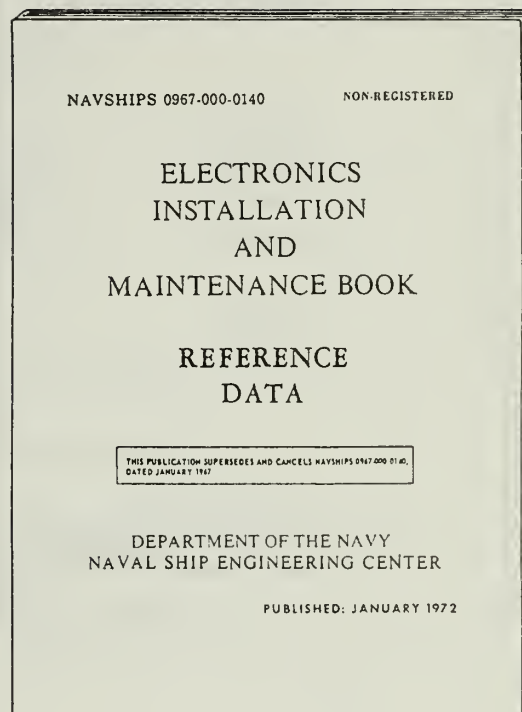
Section	
1	*General Information*
2	*Basic Measurements*
3	*Test Techniques and Practices*
4	*Waveform Interpretation*
5	*Antenna and Transmission Line Measurements*
6	*System Testing*

REFERENCE DATA, NAVSEA SE000-00-EIM-140.—This EIMB handbook contains an encyclopedic arrangement of useful definitions, abbreviations, formulas, and other data related to electronic installations and maintenance. It is a "ready reference" for you to use on the bench for maintenance or in the classroom for study. The handbook has 3 sections:
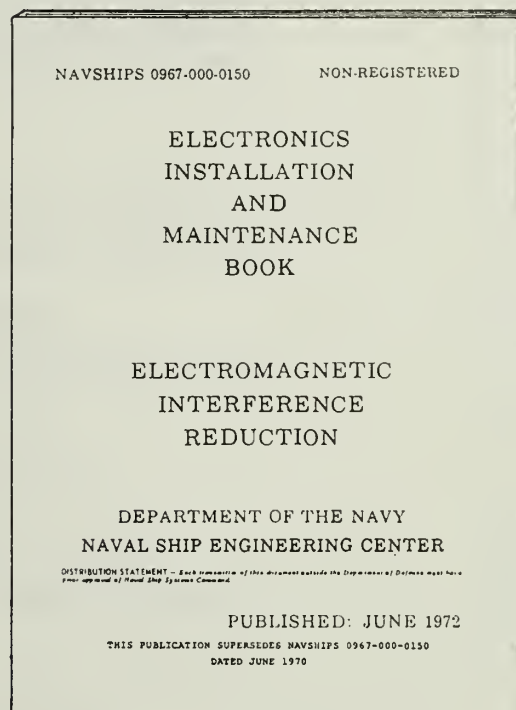
Section

1   *Introduction*
2   *Encyclopedia*
3   *Charts, Graphs, Lists, and Tables*

NAVSHIPS 0967-000-0140   NON-REGISTERED

ELECTRONICS
INSTALLATION
AND
MAINTENANCE BOOK

REFERENCE
DATA

THIS PUBLICATION SUPERSEDES AND CANCELS NAVSHIPS 0967-000-0140,
DATED JANUARY 1967

DEPARTMENT OF THE NAVY
NAVAL SHIP ENGINEERING CENTER

PUBLISHED: JANUARY 1972

ELECTROMAGNETIC INTERFERENCE REDUCTION, NAVSEA SE000-00-EIM-150.—This EIMB handbook gives information and approved procedures for identifying, reducing or eliminating Electromagnetic Interference (EMI). Although, mainly intended for technicians who install and maintain electronic equipments at sea, it does contain information useful to all technicians. The handbook has the following 12 sections:

Section

1   *Purpose and Scope*
2   *Electromagnetic Interference*
3   *General Sources of EMI*
4   *Types of EMI*
5   *Method of Coupling EMI*
6   *Interference from Electrical Devices*
7   *Communications Equipment Interference*
8   *Hull-Generated Intermodulation Interference*
9   *Radar Systems Interference*
10   *EMI Reduction Methods*
11   *Shipboard Electromagnetic Tests*
12   *Operating Practices for EMI Reduction*

NAVSHIPS 0967-000-0150   NON-REGISTERED

ELECTRONICS
INSTALLATION
AND
MAINTENANCE
BOOK

ELECTROMAGNETIC
INTERFERENCE
REDUCTION

DEPARTMENT OF THE NAVY
NAVAL SHIP ENGINEERING CENTER

DISTRIBUTION STATEMENT — Each transmittal of this document outside the Department of Defense must have
prior approval of Naval Ship Systems Command

PUBLISHED: JUNE 1972

THIS PUBLICATION SUPERSEDES NAVSHIPS 0967-000-0150
DATED JUNE 1970

NAVSEA SE000-00-EIM-160

ELECTRONICS

INSTALLATION

AND

MAINTENANCE BOOK

GENERAL

MAINTENANCE

Published by direction of
COMMANDER, NAVAL SEA SYSTEMS COMMAND

1 JANUARY 1981
FOR OFFICIAL USE ONLY

GENERAL MAINTENANCE, NAVSEA SE000-00-EIM-160.—This EIMB handbook is your informative and complete maintenance reference. All technicians who maintain electronics and electrical equipment should have this handbook available to supplement information contained in technical manuals. It contains the following types of information:

● Routine maintenance concepts, techniques, and procedures common to all electronic and electrical equipment preventive maintenance programs.

● Equipment-level and system-level maintenance philosophies.

● Maintenance of subsystems and repair parts.

The handbook's objective is to aid the maintenance effort by:

● Assembling, in one handbook, the approved procedures and concepts to use when maintaining electronic equipment.

● Standardizing these procedures and concepts to ensure uniform and acceptable electronic maintenance.

● Indoctrinating all personnel involved in electronic maintenance with the importance of good workmanship and maintenance techniques.

● Preventing personnel injury and equipment damage by emphasizing safety precautions and by prohibiting unsafe maintenance practices.

This handbook has 7 sections:

Section

1   *Introduction*
2   *Maintenance Concepts*
3   *Routine Maintenance and Maintenance Aids*
4   *Soldering Techniques*
5   *Miniature Repair*
6   *Microminiature Repair*
7   *Digital Troubleshooting Techniques*

Equipment-Oriented EIMB Handbooks

These are the second main category of EIMB handbooks. There are six equipment-oriented handbooks in the EIMB series:

1. *Communications EIMB*, NAVSEA SE000-00-EIM-010;
2. *Radar EIMB*, NAVSEA SE000-00-EIM-020;
3. *Sonar EIMB*, NAVSEA SE000-00-EIM-030;
4. *Test Equipment EIMB*, NAVSEA SE000-00-EIM-040;
5. *Radiac EIMB*, NAVSEA SE000-00-EIM-050; and
6. *Countermeasures EIMB*, NAVSEA SE000-00-EIM-060.

Each book contains the following information:

● General servicing information for a basic equipment category (such as radar).

● General servicing information for specific equipments (such as AN/SPS-10D).

● Field Change Identification Guides (FCIGs) that give field change information for specific equipments in a basic equipment category.

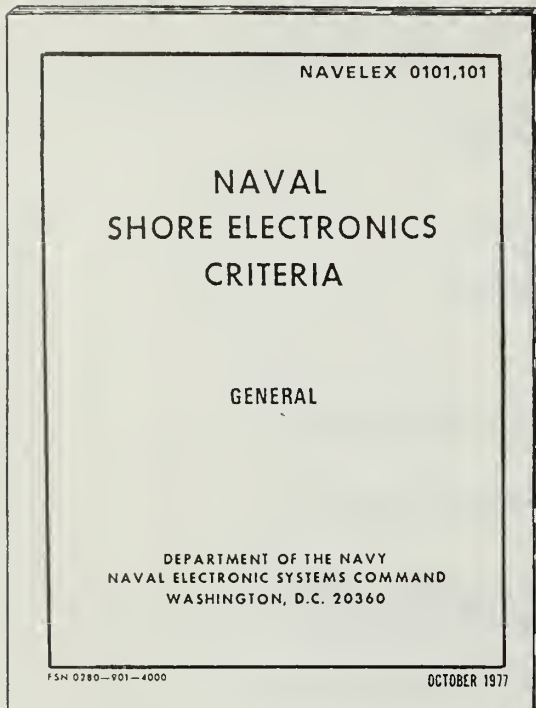● Circuit functional descriptions common to all specific equipment in a basic equipment category.

NAVAL SHORE ELECTRONICS CRITERIA, NAVELEX SERIES 0101,100

The NAVELEX 0101,100 is a series of 15 handbooks that provide a digest of electronics criteria and references meant to encourage standardization. Its main goal is to achieve uniformity and compatibility among shore electronic systems.

The series has the following handbooks:

1. *General*, NAVELEX 0101,101
2. *Naval Communications Station Design*, NAVELEX 0101,102
3. *HF Radio Propagation and Facility Site Selection*, NAVELEX 0101,103
4. *HF Radio Antenna Systems*, NAVELEX 0101,104
5. *Satellite Communication Systems*, NAVELEX 0101,105
6. *Electromagnetic Compatibility and Electromagnetic Radiation Hazards*, NAVELEX 0101,106
7. *Naval Aeronautical Facilities*, NAVELEX 0101,107
8. *Naval Security Group Elements*, NAVELEX 0101,108
9. *Naval Training Facilities*, NAVELEX 0101,109
10. *Installation Standards and Practices*, NAVELEX 0101,110
11. *Digital Computer Systems*, Volume I, NAVELEX 0101,111
12. *Microwave and Troposcatter Communications Systems*, NAVELEX 0101,112
13. *Navy VLF, LF, and MF Communication Systems*, NAVELEX 0101,113
14. *NAVELEX Calibration Program*, NAVELEX 0101,114
15. *Digital Computer Systems*, Volume II, NAVELEX 0101,115

Four of these handbooks (numbers 101, 102, 108, and 110) are described in more detail below.

NAVELEX 0101,101

NAVAL
SHORE ELECTRONICS
CRITERIA

GENERAL

DEPARTMENT OF THE NAVY
NAVAL ELECTRONIC SYSTEMS COMMAND
WASHINGTON, D.C. 20360

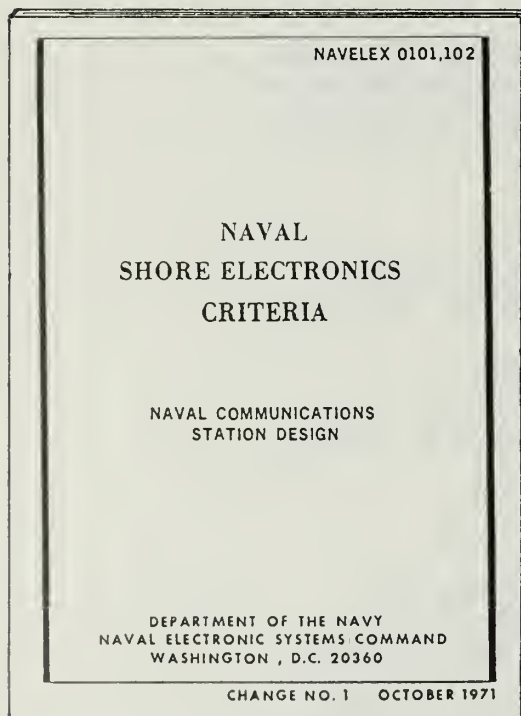FSN 0280—901—4000   OCTOBER 1977

General, NAVELEX 0101,101

This handbook covers (1) the process for establishing and supporting naval shore electronics systems, (2) the responsibilities and relationships of key commands throughout the process, and (3) the overall criteria for the planning, design, installation, turnover, operation, and maintenance phases of the process. Appendixes A and B of the handbook list key references for use during the establishment of shore electronic systems (in both numeric and alphabetic order).

The *General* handbook has the following 6 chapters:

Chapter

1	*Introduction*
2	*Organization*
3	*Planning and Programming*
4	*Engineering/Acquisition*
5	*Installation/Turnover*
6	*Operation and Maintenance*

NAVELEX 0101,102

NAVAL
SHORE ELECTRONICS
CRITERIA

NAVAL COMMUNICATIONS
STATION DESIGN

DEPARTMENT OF THE NAVY
NAVAL ELECTRONIC SYSTEMS COMMAND
WASHINGTON , D.C. 20360

CHANGE NO. 1   OCTOBER 1971

Naval Communications Station Design, NAVELEX 0101,102

This handbook is a ready reference of criteria for standardizing the design of Navy shore communications stations. It covers the design of buildings and installed equipments at a station's (1) communications center, (2) transmitter station, and (3) receiver station. It has the following 13 chapters:

Chapter

1	*Station Electronic Systems Planning*
2	*System Standardization*
3	*Communications Center*
4	*The Transmitter Station*
5	*The Receiver Station*
6	*Intersite Communication Links*
7	*General Criteria for Buildings*
8	*Station Electrical Power*
9	*Patchboards and Distribution Frames*
10	*Defense Communication System (DCS) Signal Processing Standards*
11	*Testing and Design Verification*
12	*Communications Electronic Groundings*
13	*Transportable Transmitter Receiver (T/R) Stations*

Naval Security Group Elements, NAVELEX 0101,108

This handbook gives criteria, references, and acceptable practices for standardized planning, installation, and check-out of electronics systems and equipments at NAVSECGRU elements. The handbook has the following 9 chapters:

Chapter

1	*System Planning*
2	*Mission and Functions*
3	*Site Criteria and System Effectiveness*
4	*System Design and Performance*
5	*Naval Security Group Systems*
6	*Building Criteria*
7	*Electrical Power*
8	*Grounding and Bonding*
9	*Physical Security*

NAVELEX 0101,108

NAVAL
SHORE ELECTRONICS
CRITERIA

NAVAL SECURITY GROUP ELEMENTS

DEPARTMENT OF THE NAVY
NAVAL ELECTRONIC SYSTEMS COMMAND
WASHINGTON, D.C. 20360

FOR OFFICIAL USE ONLY

FSN 0280-900 6000   MAY 1973

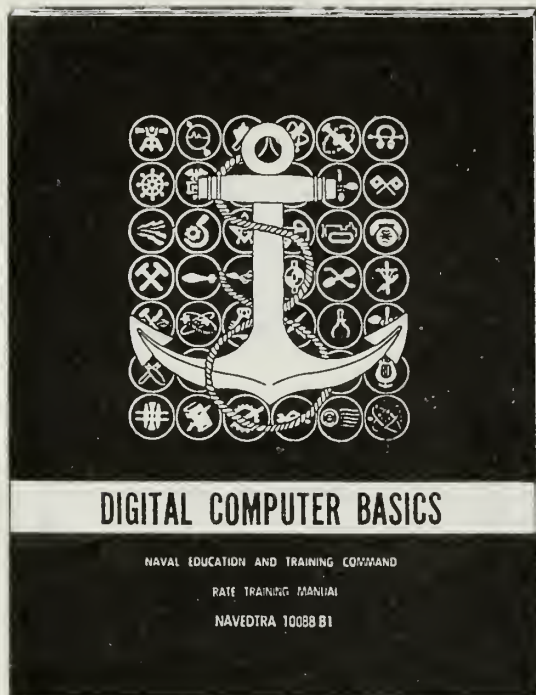## Installation Standards and Practices, NAVELEX 0101,110

This handbook lists recommended practices for installing electronic equipment. From nuts and bolts to connectors and cables, this is an excellent reference to use and study. The handbook has the following 19 chapters:

Chapter

1	*Safety*
2	*Miniaturized Circuit Equipment*
3	*Metal Joining and Cutting*
4	*Hardware (Metal)*
5	*Surface Protection*
6	*Wire and Cable*
7	*Cabling and Fabrication Methods*
8	*Cable and Conductor Terminations*
9	*Coaxial Connectors*
10	*Coaxial Cables*
11	*Aerial RF Transmission Lines*
12	*Installation of Direct-Burial Coaxial Cable*
13	*Waveguides*
14	*Transportable and Mobile Installations*
15	*Equipment, Equipment Handling, and Cabinets*
16	*Power Supplies*
17	*Antennas*
18	*Electronic Grounding*
19	*Installation Check-out*
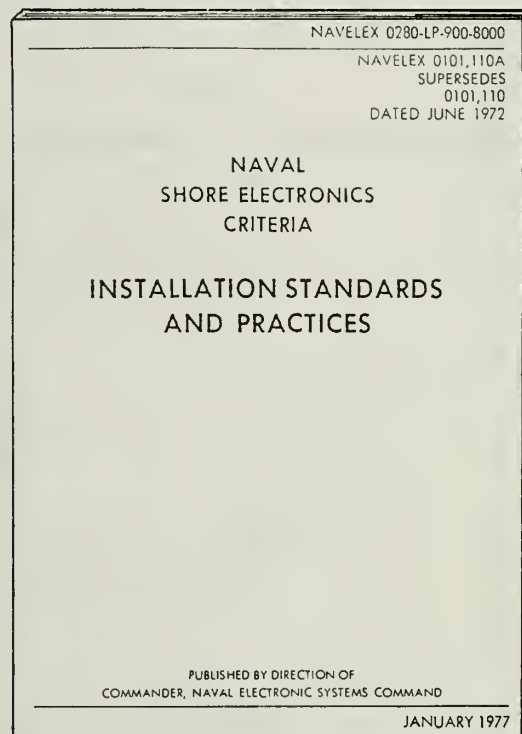
Appendix A of the handbook has handy tables and reference data you'll need to plan and install electronic equipment.

NAVELEX 0280-LP-900-8000
NAVELEX 0101,110A
SUPERSEDES
0101,110
DATED JUNE 1972

NAVAL
SHORE ELECTRONICS
CRITERIA

INSTALLATION STANDARDS
AND PRACTICES

PUBLISHED BY DIRECTION OF
COMMANDER, NAVAL ELECTRONIC SYSTEMS COMMAND

JANUARY 1977

DIGITAL COMPUTER BASICS, NAVEDTRA 10088

This manual is a reference for all technicians whose job requires a basic knowledge of electronic data processing. It covers the following subjects:

● Basics of computers and Automatic Data Processing (ADP).

● Data-processing circuits and components.

● Number systems, Boolean algebra, and logic symbology.

● Operation of computer circuits.

● Basic principles of analog-to-digital and digital-to-analog conversion.

● Principles of programming. (This subject contains three parts. Part I covers basic programming concepts. Part II establishes a set of instructions for a hypothetical computer. It then explains how the computer interprets these instructions and operates, using machine language. Part III explains the purpose and uses of compilers.)

● Diagnostic maintenance routines (maintenance programs). (Shows how these routines aid isolation of malfunctions in a data-processing system.)

EQUIPMENT TECHNICAL MANUALS

Your maintenance and repair efforts will most often refer you to technical manuals. There are many technical manual formats in use. The two most common are (1) the *conventional eight-chapter technical manual*, and (2) the *functionally oriented maintenance manual*.

Conventional Eight-Chapter Technical Manual

This is the most common format. MIL-M-15071H, *Military Specification Manual, Technical*, the military specification for equipment and system technical manuals, lays out the format and content requirements for these manuals. If the manual is classified, OPNAVINST 5510.1 requires printing the security classification at the top and bottom of the front cover, back cover, title page, and every inside page.

The following paragraphs describe two important parts of the conventional technical manual: (1) front matter, and (2) technical content.

FRONT MATTER.—All technical manuals, and each volume of multivolume manuals, contain front matter. A technical manual's front matter consists of a *cover and a title page*, *foreword*, *list of effective pages*, *change record*, *table of contents*, *list of illustrations*, *list of tables*, and *description of codes and symbols*.

1. **The cover and the title page** both contain the equipment or system nomenclature, security classification, publication number, volume number (if multivolume), and the command in charge of the equipment. Also, the title page has an approval date and, if needed, a change number and date.

2. **The foreword** explains the content, usage, and intent of the manual.

3. **The list of effective pages** lists all pages of the manual and shows the change status of each page.

4. **The record of changes** is to be filled in with information on the changes entered in the manual.

5. **The table of contents** contains the following information:

   a. A list of the chapters, sections, and main paragraphs, giving the number, title, and page number for each.

   b. A list of illustrations, giving the number, title, and page number of each.

   c. A list of tables, giving the number, title, and page number of the table.

In multivolume manuals, volume I contains a complete table of contents covering all volumes. The other volumes contain only their own table of contents.

6. **The description of codes and symbols** is a listing of the codes and symbols used in that technical manual. It also tells how to interpret the symbols used.

TECHNICAL CONTENT.—The technical content part of a conventional technical manual contains the substance of the manual. It is divided into eight chapters. The following is a brief outline of each chapter's contents.

Chapter 1, *General Information and Safety Precautions*.—This chapter of a conventional technical manual gives a general description of the equipment or system covered. It allows you to easily determine the equipment's intended use, its capabilities, and the relationship of its units. It also lists all applicable safety precautions. Chapter 1 has the following sections:

● A **general** or **equipment description** that briefly and non-technically describes the equipment's intended use, capabilities, and limitations.
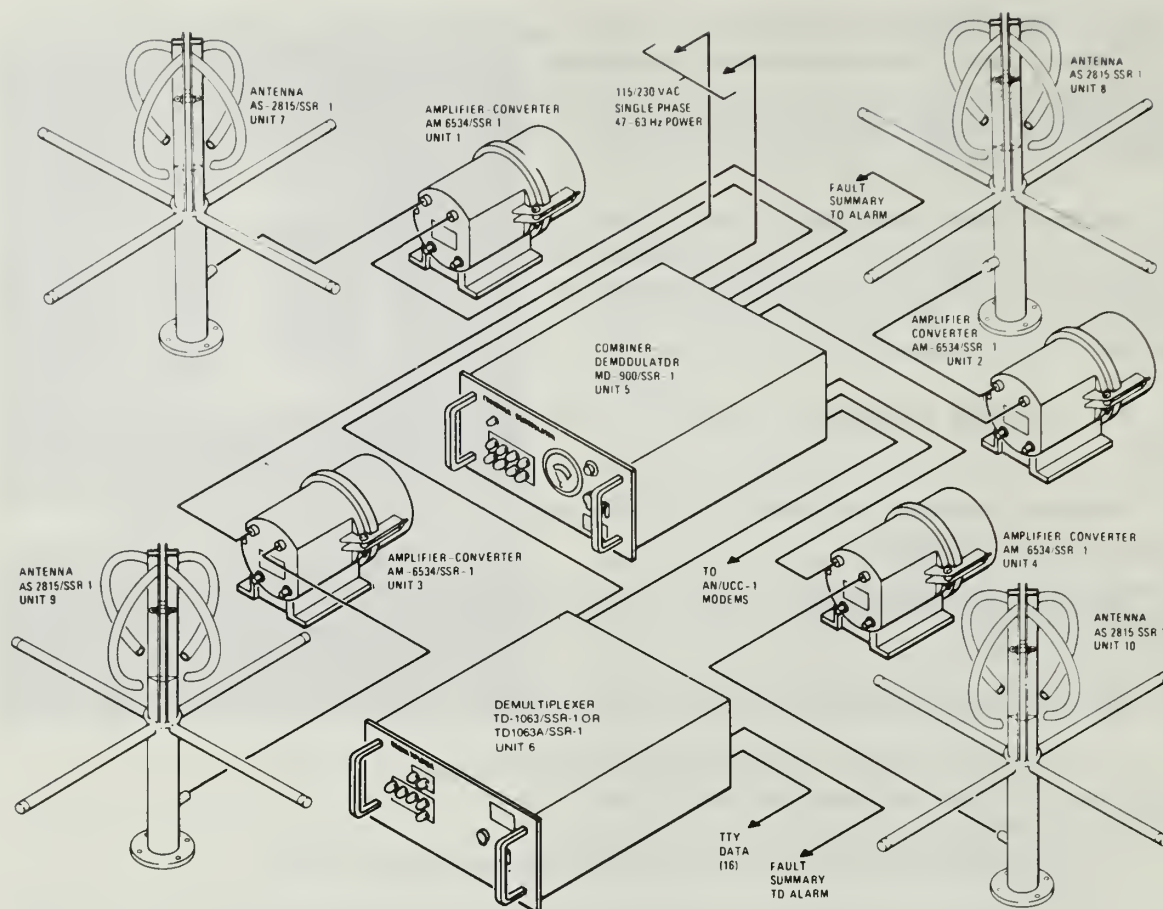
Figure 2-1.—Illustration showing relationship of units.

1. Handle (2)
2. CHANNEL DISABLED indicator CR1
3. Front-panel meter M2
4. TEST SELECT switch S1
5. AC PWR indicator DS1
6. AC PWR circuit breaker CB1
7. OUTPUT MONITOR jack J3

8. DC FAULT indicator CR9
9. DEMOD FAULT indicator CR8
10. OSC FAULT indicator CR7
11. COMB FAULT indicator CR6
12. PRESELECTOR-DOWN-CONV FAULT indicator CR2 through CR5

NOTE: Reference designations are abbreviated. Complete reference designations include the prefix 5A1A6A1.
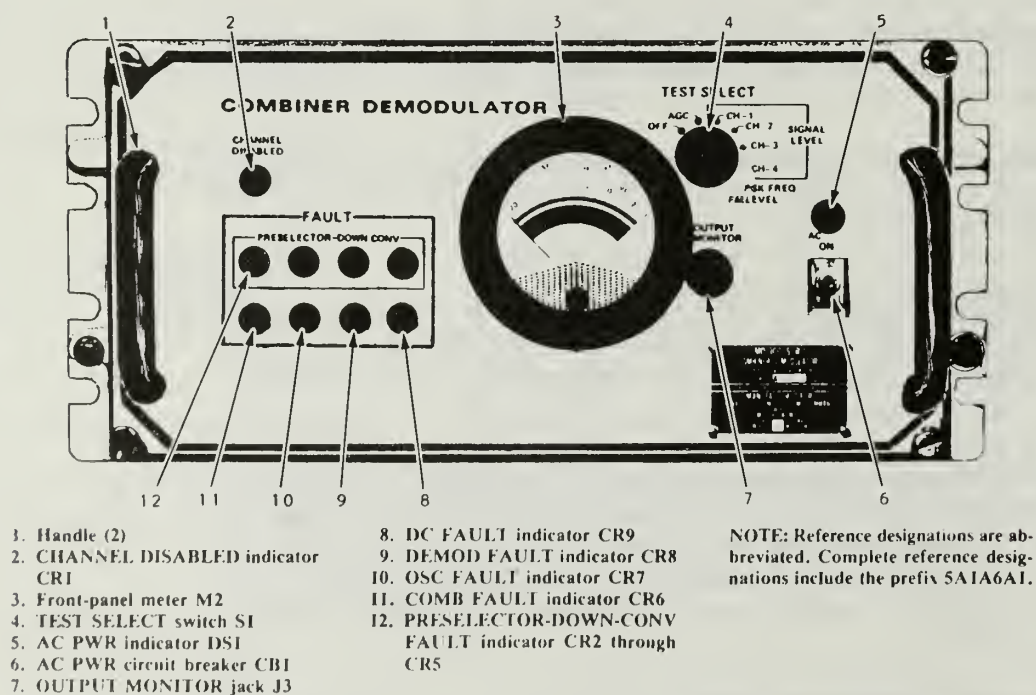
162.417

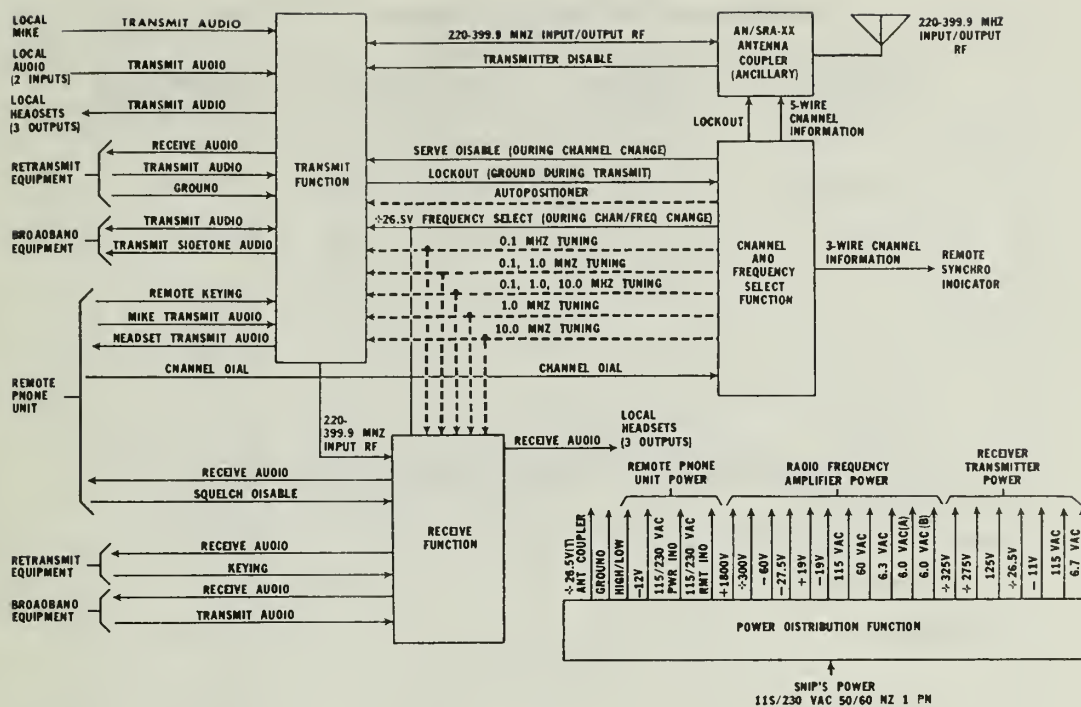Figure 2-2.—Description of controls and indictors.

2-20

Figure 2-3.—Overall functional block diagram.

● A pictorial illustration showing the **relationship of units** of the equipment or system, and the interconnections between units. See figure 2-1.

● **Reference data** that includes nameplate data, functional characteristics, capabilities and limitations, rated outputs, and environmental information.

● A list of **equipment, accessories, and documents supplied** or delivered with the equipment. This section also has a table of **field and factory changes** that lists all applicable changes included in the preparation of the manual.

Chapter 2, *Operation*.—This chapter of a technical manual gives you the routine and emergency operating instructions, operating limits, starting and stopping instructions, and any other instructions you'll need to operate the equipment. The chapter has the following sections:

● A description of operator **controls and indicators** that includes names, positions, and operating functions of each control and the normal operating condition of each indicator. See figure 2-2.

● Equipment **operating procedures** that include operator turn-on, modes of operation, operation under interfering conditions, operator turn-off, emergency operation, and emergency turn-off.

● **Operator's maintenance instructions** that contain operating checks and adjustments, preventive maintenance, and emergency maintenance.

Chapter 3, *Functional Description*.—This chapter gives you a detailed analysis of the principles of operation of the overall equipment and its major functions. It also details supporting functions, such as power, cooling, and control. The chapter has the following sections:

● **Overall functional block diagrams** that show all the major functions of the equipment, using blocks to represent individual units or assemblies. See figure 2-3. Each block on the diagram is identified by name, nomenclature,

2-21

FUNCTIONAL AREA	TROUBLE-SHOOTING PARAGRAPH	TROUBLE-SHOOTING DIAGRAM FIG. NO.	DESCRIPTION PARAGRAPH	ADJUSTMENT PARAGRAPH
AC Power				
Combiner-Demodulator	5-7	5-8	3-49	- - -
Demultiplexer	5-8	5-8	3-58	- - -
Channel Gain	5-9	5-5	3-52	6-7
DC Power				
Combiner-Demodulator	5-10			
+20 Volts	5-11	5-9	3-52	- - -
+12 Volts	5-12	5-9	3-55	- - -
LO Frequency Control	5-26	5-6	3-86, 3-90	6-6
Normal Operation/Test Control	5-27	5-5	3-53	- - -
Operating Mode Control	5-28	5-6	3-146	- - -
PSK Frequency	5-29	5-17	3-148, 3-159	6-8

Figure 2-4.—Troubleshooting index.

and number. Connecting lines and arrowheads show the direction of signal flow. Inputs and outputs are labeled, and waveforms may be included.

● Separate **functional block diagram**s for each of the major functions of the equipment. They describe in detail the development of each function from input to output.

● **Simplified schematic diagram**s that show the electrical connections and functions of a specific circuit.

Chapter 4, *Scheduled Maintenance*.—This chapter contains the preventive maintenance procedures and performance test instructions you'll use to perform scheduled maintenance. (Note: The scheduled maintenance instructions in the technical manual are canceled upon introduction of official 3M System PMS.)

Chapter 4 has the following sections:

● An **introduction** explaining the purpose, scope, and arrangement of scheduled performance tests and procedures.

● **Preventive maintenance procedure**s you'll use to to inspect, clean, and lubricate the equipment.

● **Scheduled performance tests** that contain step-by-step procedures to follow to be sure the equipment is operating within standards in all modes of operation.

REFERENCE DESIGNATION	FUNCTIONAL NAME	ENERGIZING VOLTAGE	TROUBLESHOOTING DIAGRAM FIG. NO.
5A1A6A1CR1	CHANNEL DISABLED	+20 volts	5-18, 5-19
5A1A6A1CR2	CH 1 PRESELECTOR DOWN CONV FAULT	+20 volts	5-18, 5-19
5A1A6A1CR3	CH 2 PRESELECTOR DOWN CONV FAULT	+20 volts	5-18, 5-19
5A1A6A1CR4	CH 3 PRESELECTOR DOWN CONV FAULT	+20 volts	5-18, 5-19
5A1A6A1CR5	CH 4 PRESELECTOR DOWN CONV FAULT	+20 volts	5-18, 5-19

CIRCUIT BREAKER INDEX

REFERENCE DESIGNATION	FRONT-PANEL MARKING	RATING (VOLTS AC)	PROTECTED CIRCUIT	TROUBLESHOOTING DIAGRAM FIG. NO.
5A1A6A1CB1	AC PWR	115/230	AC input line	5-18
6A1A5A1CB1	AC PWR	115/230	AC input line	5-28

RELAY INDEX

REFERENCE DESIGNATION	FUNCTIONAL NAME	ENERGIZING VOLTAGE	TROUBLESHOOTING DIAGRAM FIG. NO.
1A1FL1K1, 2A1FL1K1, 3A1FL1K1, 4A1FL1K1	Normal-operation/test-mode relay	+12 volts	5-11
5A1PS1A1K1[1]	Overload relay	+20 volts	5-20
5A2A1K1	Fault relay	+12 volts	5-22
6A1PS1K1[1]	Overload relay (±20 volts)	+20 volts	5-30
6A1PS1K2[1]	Overload relay (+10 volts)	+20 volts	5-30
6A2A1K1	Fault relay	+20 volts	5-31

[1] Assemblies are source-coded for repair at the depot level.

Figure 2-5.—Indicator lamp and light-emitting diode, circuit breaker, and relay indexes.

Chapter 5, *Troubleshooting*.—This chapter contains functional descriptions and instructions needed to locate faults and conduct tests on each component, assembly, or subassembly of the equipment. The chapter has the following sections:

● A **troubleshooting index** that lists the equipment's functional areas and gives references to the appropriate procedures and diagrams for troubleshooting a specific function. See figure 2-4.

● **Lamp, protective device, and relay indexes** that list all of the equipment's indicator lamps, fuses, circuit breakers, and relays with the item reference designation, function name, voltages, ratings, and a reference to the troubleshooting diagram. See figure 2-5.

● A **maintenance turn-on procedure** that lists the step-by-step procedure for energizing the equipment. It gives the correct indications for each step,

STEP	OBSERVE	REFERENCE
1. Preliminary Procedure		
a. At Combiner-Demodulator, perform following steps:		
(1) Set AC PWR circuit breaker to OFF.		
(2) Check connections of external cables at rear of unit.	All cables are securely connected.	Functional signal-flow diagram, figure 5-2.
(3) Open drawer. Check modules and cable connections.	All modules are secured in operating positions and cable connections are tight.	Interconnection diagram, figure 5-13.
b. At Demultiplexer, perform following steps:		
(1) Set AC PWR circuit breaker to OFF.		
(2) Check connections of external cables at rear of unit.	All cables are securely connected.	Functional signal-flow diagram, figure 5-2.
(3) Open drawer. Check modules and cable connections.	All modules are secured in operating positions and cable connections are tight.	Interconnection diagram, figure 5-24.

Figure 2-6.—Maintenance turn-on procedure.

and the troubleshooting action to take for out-of-tolerance indications. See figure 2-6.

● **Signal flow diagrams** that illustrate the functional development of each equipment output from its origin to its measurable output. These diagrams are a foldout at the end of chapter 5 in the technical manual. They include test points, test parameters, schematic diagram references, adjustments, controls, switches, mechanical couplings, and other data needed to isolate malfunctions. See foldout figure 2-7 at the end of this topic.

● **Control diagrams** that show control circuits and group them according to their common characteristics. See foldout figure 2-8 at the end of this topic.

● **Power distribution diagrams** that show power distribution to, and within, the equipment and subassemblies. See foldout figure 2-9 at the end of this topic.

● **Maintenance schematic diagrams** that completely cover the equipment circuitry. These include unit-to-unit interconnections, and unit assembly and subassembly schematic diagrams. See foldout figure 2-10 at the end of this topic.

Chapter 6, *Corrective Maintenance*.—This chapter of a technical manual contains the instructions required to remove, repair, adjust, reinstall, and align circuit elements and mechanical items. If necessary, exploded or sectional views and parts placement diagrams are included here. Also included is information on special tools and test equipment you'll need. A section on **alignment** gives detailed instructions for aligning the equipment or system. It includes all inputs, points of test signal injection, point of measurement, results expected, and test equipment required.

Chapter 7, *Parts List.*—This chapter lists and identifies all repair parts and attaching hardware. It contains the following information:

● An **introduction** that explains the scope and arrangement of the parts list, and gives the model and serial numbers of the equipments covered.

● A **list of major units** that lists individual units of the equipment in numerical order, by unit number.

● A **parts lists**, grouped by major unit, that identifies Circuit Symbol Numbers (CSNs), also called *Reference Designation* (REFDES). Parts for each unit are listed in alphanumeric order, and are arranged as follows:

Unit	1
(Cabinet parts)	1AT1
	1B1
	1C1
	1CR1
	1R1
	etc.
Assembly	1A1
(Assembly parts)	1A1AT1
	1A1B1
	1A1C1
	1A1CR1
	1A1R1
	etc.
Subassembly	1A1A1
(Subassembly parts)	1A1A1AT1
	1A1A1B1
	1A1A1C1
	1A1A1CR1
	1A1A1R1
	etc.
Unit	2
	etc.

● A **list of manufacturers** containing the names, addresses, and Commercial and Government Entity (CAGE) codes (formerly known as the FSCM) for all manufacturers that supply parts and equipment.

Chapter 8, *Installation.*—This chapter contains all the information required for you to install the equipment. It has the following information:

● Installation drawings

● Reference publications

● Tools and materials required for installation

● Unpacking and repacking procedures

- Input requirements

- Installation procedures

- Installation check-out procedures

- Test procedures

Functionally Oriented Maintenance Manual (FOMM)

The FOMM is designed to overcome the problems found in conventional technical manuals. It combines the best features of conventional manuals and adds some new features. The MIL-M-24100B, *Functionally Oriented Maintenance Manual (FOMM) for Equipments and Systems, Military Specification, Technical Manuals*, gives detailed information on FOMMs. Following is a brief description of this category of equipment technical manual.

The FOMM is divided into two volumes: *Support* and *Troubleshooting/ Repair*.

VOLUME 1, *SUPPORT*.—This volume contains the information you need to become familiar with the equipment or system, install it, operate it, and maintain it.

VOLUME 2, *TROUBLESHOOTING/REPAIR*.—This volume is the heart of the FOMM. It has the information you need to troubleshoot and repair the equipment or system. The volume is meant to stand alone, so you can quickly isolate and correct the fault without reference to other documents. Specifically, it contains the following information:

- Basic drawings.

- Text keyed to schematics.

- Troubleshooting charts.

- Parts-location diagrams.

- Alignment, disassembly, and reassembly procedures.

- Repair data needed for you to effectively troubleshoot and repair the equipment or system.

Volume 2 of the FOMM uses functional diagrams to describe how an equipment or system operates. These diagrams are supported by text and troubleshooting charts called *Maintenance Dependency Charts* (MDCs). The layout of the MDC allows rapid fault isolation.

Information in volume 2 of the FOMM is presented in three hierarchial levels:

1. Level one is *overall function* information. It identifies the major functions of the equipment or system. This level gives troubleshooting information for diagnosing faults to a major function.

1. USE (OVERALL FUNCTION) DATA PACKAGE TO TEST AND ISOLATE THE FAULT TO A MAJOR FUNCTION OF THE EQUIPMENT.

2. USE (MAJOR FUNCTION) DATA PACKAGE TO ISOLATE THE FAULT TO AN ITEM OF HARDWARE.

TRANSMIT FUNCTION

RECEIVE FUNCTION

DISPLAY FUNCTION

POWER FUNCTION

MAJOR FUNCTION DATA PACKAGES

3. USE (HARDWARE) DATA PACKAGE TO ISOLATE THE FAULT TO A COMPONENT.

ANTENNA AND DUPLEXER

TRANSMITTER/ RECEIVER

CONTROL INDICATOR

MASTER INDICATOR
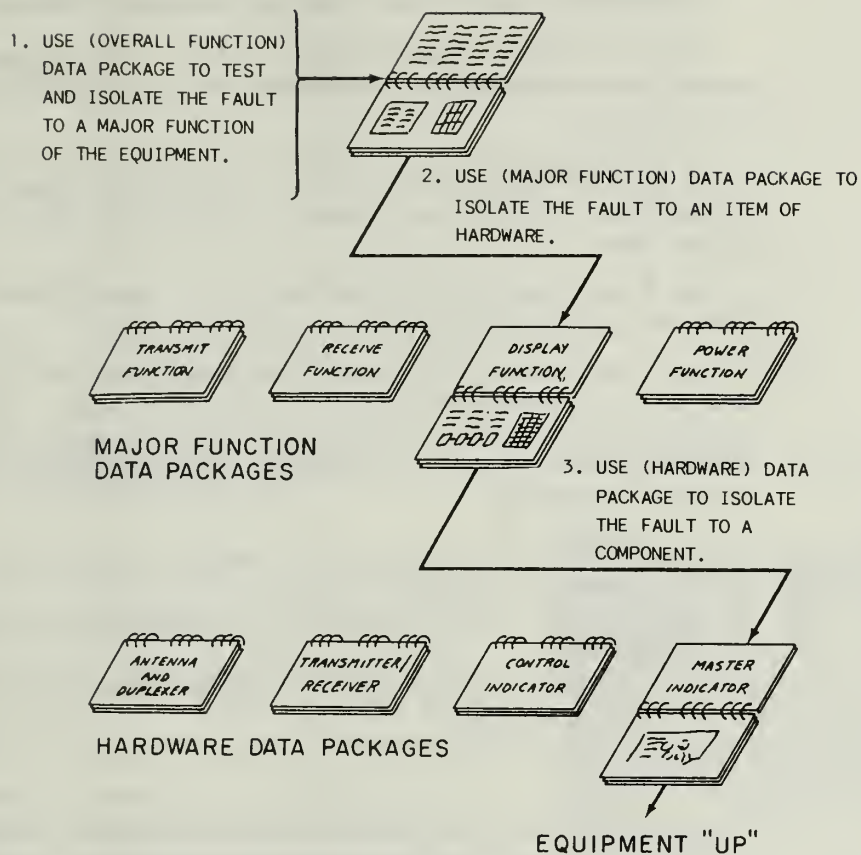
HARDWARE DATA PACKAGES

EQUIPMENT "UP"

Figure 2-11.—FOMM troubleshooting philosophy.

2. Level two is *major function*. This level gives the information you'll need to isolate a faulty function to a piece of hardware.

3. Level three is *hardware information*. This level gives you information for isolating faults and making repairs to a specific component or group of components.

The information at each of the three levels is arranged in *data packages*. Each data package contains all the information required to perform a given troubleshooting task without going to other references. This *troubleshooting philosophy* means you **must** begin the troubleshooting and repair task by using the *overall function information* data package to test and isolate a fault to a major function of the equipment. Then, complete the task as shown in figure 2-11.

The following shades of colors are used on the data package diagrams to identify the various functional levels and hardware:

● Light gray indicates a *major physical unit*.

● A darker shade of gray indicates a *subordinate physical unit*.

● Light blue indicates a *composite functional group*.

● A darker shade of blue indicates a *subfunctional group*.

2-27

Following is a description of the data packages for each of the three levels.

Overall Function Data Package.—This is one package of data that covers the overall equipment or system. The package contains the following information:

● One *overall function diagram* for the system or equipment that shows relationships of all the major functions. See foldout figure 2-12 at the end of this topic.

● A keyed text explaining the operation of the equipment and, basically, how the major function operates. See figure 2-12.

● A Maintenance Dependency Chart (MDC) that gives all the steps, tests, and signal specifications needed to isolate the fault to one of the major functions. See foldout figure 2-13 at the end of this topic. Closely associated with the overall function data package, but not actually part of it, are the following diagrams:

1. A family tree, showing the hardware items that make up the equipment or system.
2. A cabling diagram, showing the interconnections between major functions.
3. A check-out chart, giving a quick method for testing the equipment and entering the MDC.
4. The alignment information for actions to be performed at the equipment level.

Overall function data packages may contain "intermediate-level" data packages. These packages are expansions of the basic overall function data package and are used when required information cannot be included on a single sheet.
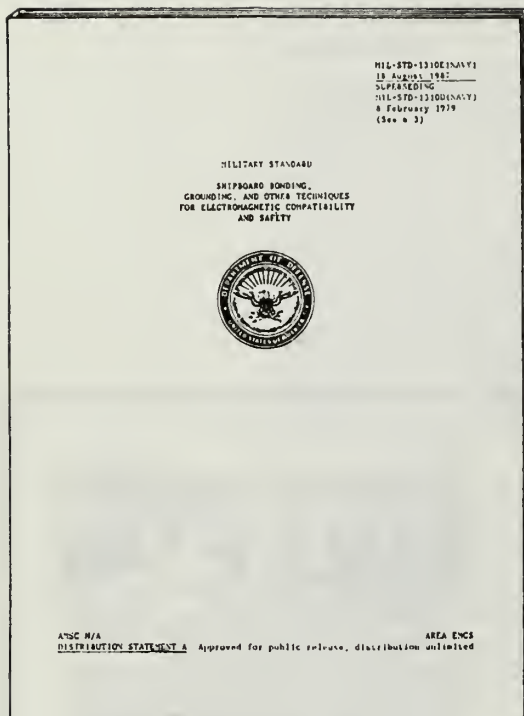
Major Function Data Package.—There is a separate data package for each major function identified by the overall data package. Each major function data package identifies the hardware (units, assemblies, and subassemblies) that are parts of the major function. This package gives the information to isolate a fault to a specific *hardware data package*. Major function data packages contain the following information:

● One major function diagram.

● A keyed text, explaining the operation details of the major function.

● An MDC, providing all the steps, tests, and signal specifications required to isolate a fault to a particular item of hardware.

Hardware Data Package.—There is a separate hardware data package for each unit, assembly, and subassembly identified in the major function data package. Hardware data packages are listed in numerical or alphanumerical order, based on either the nomenclature or the reference designation numbers. Each package includes all data necessary to locate and repair any malfunction that's isolated to the hardware item. Hardware data packages contain the following information for each unit, assembly, or subassembly:

● A schematic diagram.

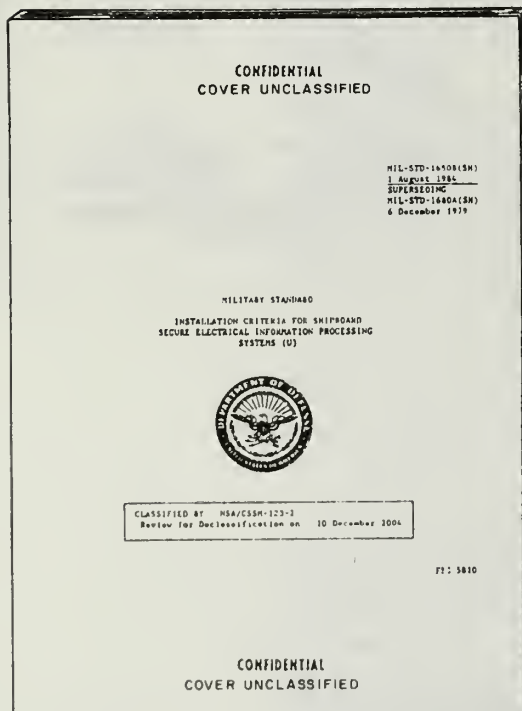● A keyed text, explaining the function of the modules, circuits, and components.

- An MDC, providing all the steps, tests, and signal specifications required to isolate a fault to a particular circuit or component.

- A wiring diagram for front panels, chassis, and cabinets.

- A parts location illustration and data for locating and identifying all repairable and replaceable parts.

- Alignment, repair, and overhaul procedures.

- Illustrated parts breakdown or exploded views.

ENGINEERING INFORMATION BULLETIN (EIB), NAVSEA S0111-XX-EIB-XXX

The Naval Sea Systems Command publishes the EIB (formerly known as the *Electronics Information Bulletin*) every 2 weeks. It is sent to all ships, electronics installations, and maintenance activities. The EIB normally contains information that only benefits the activities that receive it.

It gives advance information on field changes, installation techniques, helpful suggestions adopted by various shipyards and organizations, and new publications. Information in the EIB is both authoritative and directive in nature. Reference is frequently made to a particular issue as the authority for implementing information from the EIB. Classified data is published in Confidential issues of the EIB (CEIBs).

The EIB is not a permanent-type publication. Articles of lasting interest are included in future EIMBs. Also, the EIMB lists field changes that were first published in the EIB. But, the EIMB version of field changes does not include procedural steps for accomplishment, like the EIB. You can find the procedural steps in official NAVSEA field change bulletins. These are listed in the EIMB. They are stocked by the U.S. Navy Publications and Forms Center, Philadelphia, Pennsylvania.

NAVAL SECURITY GROUP TECH NOTES

This periodical, which supersedes the *Electronics Material Bulletin*, provides a means for the COMNAVSECGRU to circulate authoritative technical information to NAVSECGRU elements worldwide. It is unclassified and informal and contains technical knowledge and material information important to NAVSECGRU maintenance personnel.

MIL-STD-1310E(NAVY)
18 August 1987
SUPERSEDING
MIL-STD-1310D(NAVY)
8 February 1979
(See n 3)

MILITARY STANDARD

SHIPBOARD BONDING,
GROUNDING, AND OTHER TECHNIQUES
FOR ELECTROMAGNETIC COMPATIBILITY
AND SAFETY

AMSC N/A   AREA EMCS
DISTRIBUTION STATEMENT A Approved for public release, distribution unlimited

SHIPBOARD BONDING, GROUNDING, AND OTHER TECHNIQUES FOR ELECTROMAGNETIC COMPATIBILITY AND SAFETY, MIL-STD-1310(NAVY)

The requirements in this MIL-STD apply to all new shipboard electronic equipment installations, and to the parts of existing installations that are being modified. Reading MIL-STD-1310 is a must if you're stationed aboard a ship. Use the procedures and methods in this publication when you must do any of the following:

- Bond, ground, insulate, or use non-metallic materials to provide electromagnetic compatibility.

- Provide safety from electrical shock hazards.

- Prevent electrical transmission of classified information.

- Provide a dc reference ground.

CONFIDENTIAL
COVER UNCLASSIFIED

MIL-STD-1680B(SH)
1 August 1984
SUPERSEDING
MIL-STD-1680A(SH)
6 December 1979

MILITARY STANDARD

INSTALLATION CRITERIA FOR SHIPBOARD
SECURE ELECTRICAL INFORMATION PROCESSING
SYSTEMS (U)

CLASSIFIED BY NSA/CSSM-123-2
Review for Declassification on 10 December 2004

FSC 5810

CONFIDENTIAL
COVER UNCLASSIFIED

INSTALLATION CRITERIA FOR SHIPBOARD SECURE ELECTRICAL INFORMATION PROCESSING SYSTEMS, MIL-STD-1680(SHIPS)

This MIL-STD gives design and installation criteria for shipboard secure electrical information-processing systems. It translates the requirements of numerous security directives into specific instructions meant to control compromising emanations. These instructions are based on data gathered from evaluations of past information-processing installations and on operational experience.

METROLOGY AUTOMATED SYSTEM FOR UNIFORM RECALL AND REPORTING (MEASURE) USERS MANUAL, OP 43P6A

The MEASURE system provides participating activities with a standardized system of managing its metrology assets. Metrology assets include Radioactivity Detection Indication and Computation (RADIAC) equipment and Test and Monitoring Systems (TAMS). As a CTM, you will use various TAMS equipment in your duties. TAMS is divided again into the following equipment areas:

- Built-in-Test/Built-in-Test Equipment (BIT/BITE)

- Automatic Test Equipment (ATE)

- General-Purpose Electronic Test Equipment (GPETE)

- Special-Purpose Electronic Test Equipment (SPETE)

The management procedures in the *MEASURE Users Manual* apply to the following activities:

- Naval calibration facilities using the MEASURE system.

- Ship and shore activities obtaining services from the calibration facilities.

- Activities of other military services that use the MEASURE system.

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                                    OP 43P6A

   METROLOGY AUTOMATED SYSTEM
              FOR
   UNIFORM RECALL AND REPORTING
            (MEASURE)

       U S E R S   M A N U A L



       OFFICE OF THE CHIEF OF NAVAL OPERATIONS
            DEPARTMENT OF THE NAVY
            WASHINGTON, D.C. 20350

                              JULY 1981
                        (Change 2 November 1984)
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MAINTENANCE ADMINISTRATION

Maintaining electrical and electronics equipment includes more than just doing preventive and corrective maintenance. While these are your primary duties, you are also responsible for the *paperwork* supporting those maintenance efforts. It is the paperwork that helps keep the administrative part of your shop functioning smoothly. The following paragraphs describe a few of the documents you should reference for information and guidance on your paperwork responsibilities.

NAVSECGRU LOGISTICS MANAGEMENT MANUAL, NAVSECGRUINST 4000.1

This instruction is your primary reference for maintenance administration. In it, COMNAVSECGRU has consolidated many OPNAV, NAVSECGRU, NAVELEX, NAVSEA, and other high-level maintenance administrative requirements into one instruction. Your work center should have the latest revision on hand.
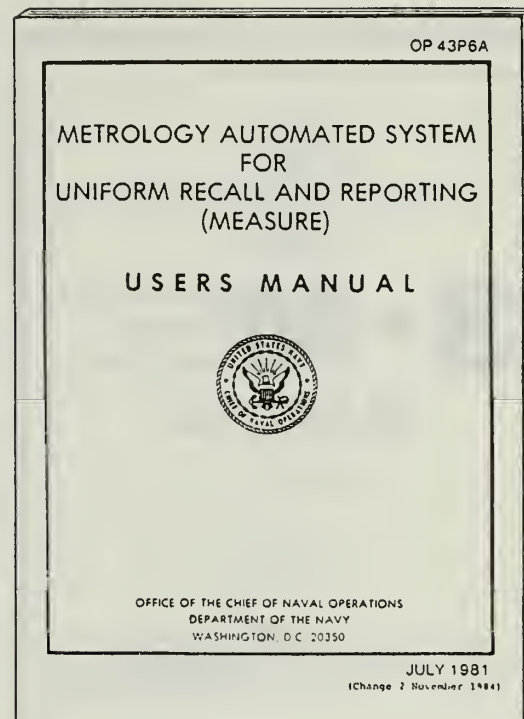
SHIPS' MAINTENANCE MATERIAL MANAGEMENT (3M) MANUAL, OPNAVINST 4790.4

SHIPS'

3-M

MAINTENANCE
MATERIAL
MANAGEMENT

MANUAL

13 AUGUST 1987

OPNAVINST 4790.4B

The primary goal of the Ships' Maintenance and Material Management (3M) system is to manage maintenance and maintenance support to produce maximum equipment operational readiness. To meet this goal, the *3M Manual* issues policy and gives detailed procedures for accomplishing the following system objectives:

- Achieve uniform maintenance standards and criteria.

- Use available manpower and material resources in maintenance and maintenance-support efforts effectively.

- Document information relating to maintenance and maintenance-support actions.

- Improve maintainability and reliability of systems and equipment by providing documented maintenance information for analysis.

- Provide a means for reporting ship configuration changes.

- Identify and reduce the cost of maintenance and maintenance support in terms of manpower and material.

- Reduce the cost of accidental material damage by accurately identifying and analyzing such costs.

- Provide a means to schedule, plan, manage, and track maintenance.

- Provide a data base to aid improvements in equipment design and spare parts support.

The 3M system actually has two systems: the Planned Maintenance System (PMS), and the Maintenance Data System (MDS). Module 12 of the Cryptologic Training Series, which you'll study later, gives detailed guidance on the 3M PMS and MDS systems, and on the shore-based logistics management requirements in NAVSECGRUINST 4000.1.

EQUIPMENT IDENTIFICATION CODE (EIC) MASTER INDEX, NAMSO 4790.E2579

This two-section index provides a master listing of equipment identification codes. Section I lists EICs in numerical order, with their assigned equipment nomenclature. Section II is the reverse, it lists equipment nomenclatures in alphabetical order, with their assigned EICs. You should use this index whenever you need the EIC to document a maintenance action.

NAVY MAINTENANCE AND MATERIAL MANAGEMENT INFORMATION SYSTEM
EQUIPMENT IDENTIFICATION CODE MASTER INDEX

NAMSO 4790 E2579

PREPARED BY

NAVY MAINTENANCE SUPPORT OFFICE
P. O. BOX 2020
MECHANICSBURG, PA 17055

THIS INDEX REPLACES THE EQUIPMENT IDENTIFICATION CODE MASTER INDEX DATED NOVEMBER 1982
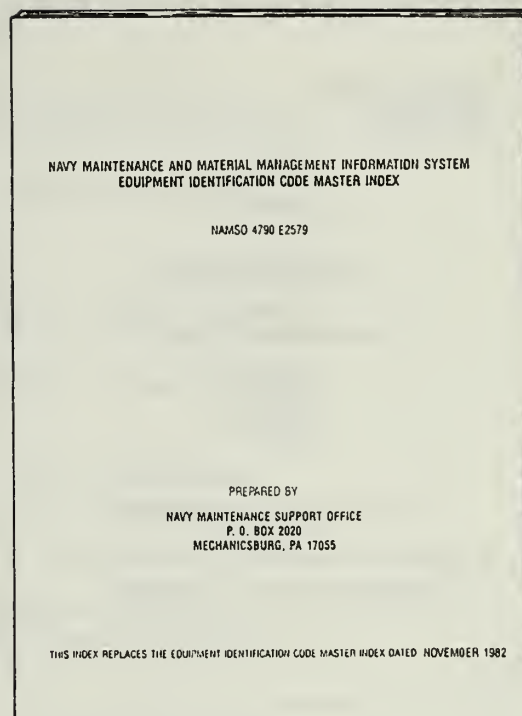
CORRECTIONS AND CHANGES TO TECHNICAL PUBLICATIONS

It is important to keep technical publications and manuals *up to date*. No matter what publication is involved, you must enter corrections promptly and correctly. Failure to do this may cause a loss of valuable time spent troubleshooting because of an outdated or inaccurate technical manual. Also, using an outdated publication may pose a safety hazard. Report any errors found in technical publications promptly.

The most common types of corrections and changes to technical publications are pen-and-ink changes, page changes, and paste-in changes. Use the following procedure when making changes to a publication:

1. Enter the change or correction as directed.

2. Write the authority for a change next to each pen-and-ink or paste-in change.

3. Record all changes on the *record of changes page* which is always in the front matter of a publication.

EIB AND EIMB CHANGES

Besides providing information on field changes, the EIB and EIMB provide information on changes to existing technical documents. You should enter any pen-and-ink corrections or changes published by the EIB or EIMB as stated above. Write the EIB or EIMB number as the issuing authority next to the correction.

GUITAR FOR USER MAINTENANCE OF NAVSEA TECHNICAL MANUALS, 0005-AA-GYD-030/TMMP

GUIDE FOR USER MAINTENANCE OF NAVSEA TECHNICAL MANUALS, 0005-AA-GYD-030/TMMP

SDD05-AA-GYD-030/TMMP

FIRST REVISION

GUIDE
FOR
USER MAINTENANCE
OF
NAVSEA TECHNICAL MANUALS

NAVSEA
TECHNICAL MANUAL MANAGEMENT PROGRAM

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PUBLISHED BY DIRECTION OF COMMANDER, NAVAL SEA SYSTEMS COMMAND

This guide shows you how to identify, obtain, and maintain Naval Sea Systems Command (NAVSEA) and Naval Electronic Systems Command (NAVELEX) technical manuals. It also shows you how to report technical manual errors.

SUMMARY

This topic introduced you to the Navy's enlisted structure and classification code system, the Cryptologic Technician community in general, and the maintenance field specifically. It discussed training publications to help you prepare for advancement, and other technical publications to help you understand the broad scope of responsibilities that you will experience on a daily basis.

As a CTM, your utmost responsibilities are (1) to *safely* maintain your equipment or system at its peak operating condition, and (2) to do the paperwork!

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Military Specification, Manuals, Technical: Equipments and Systems, Content Requirements for, MIL-M-15071H, Naval Ship Engineering Center, Washington, DC, 17 July 1978.

Military Specification, Manuals, Technical: Functionally Oriented Maintenance Manuals (FOMM) for Equipment and Systems, MIL-M-24100B, Naval Ship Engineering Center, Hyattsville, MD, 2 February 1979.

Military Specification, Manuals, Technical: Equipments and Systems, Content Requirements for, MIL-M-15071H, Naval Ship Engineering Center, Washington, DC, 17 July 1978.

AMPLIFIER CONVERTER AM 6534 SSR 1
UNIT 1 (FIG 5 11)

PRESELECTOR DOWNCONVERTER 1A1 (FIG 5–11)

PRESELECTOR FILTER ASSY FL1 (FIG 5–11)

P2 J1   P1   FL1K1J1   K1   K1J2 P1   W1   P2   J4   J3 P1 FL1J2   P1

RA SR 1   W1   CAVITY
                                                                        FLTR

50
OHMS   CR1

FL1

E1
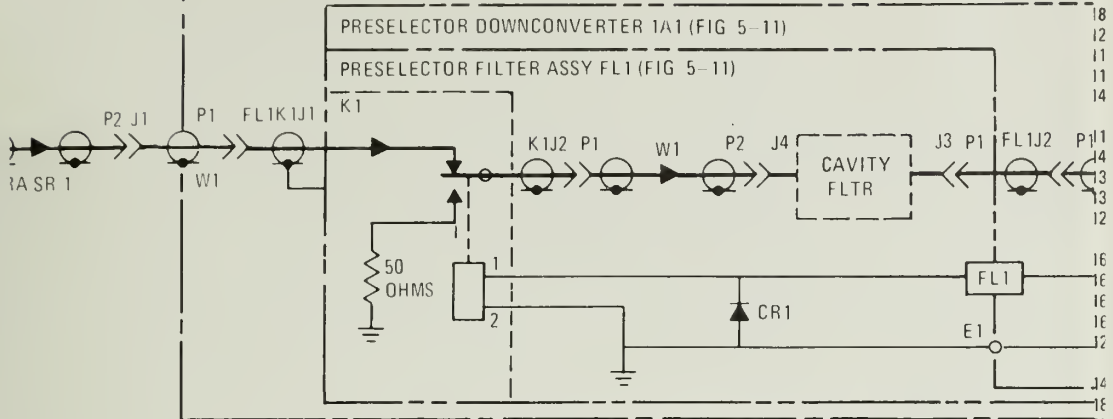
AMPLIFIER CONVERTER AM 6534 SSR 1
UNIT 2 (FIG 5 11)

                                                    SAME AS UNIT 1

P2 J1

RA SR2
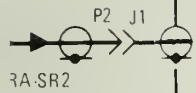
AMPLIFIER CONVERTER AM 6534 SSR 1
UNIT 3 (FIG 5 11)

                                                    SAME AS UNIT 1

P2 J1

A SR3
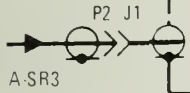
AMPLIFIER CONVERTER AM 6534 SSR 1
UNIT 4 (FIG 5 11)
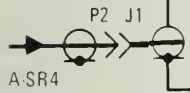
                                                    SAME AS UNIT 1

P2 J1

A SR4

ZONE
4D, 14D
9D
8A
8B
8A
8B
9C
5D, 9D
7B
7C
19D
19C
18C
18D
18C
19D
17D
18D
18C
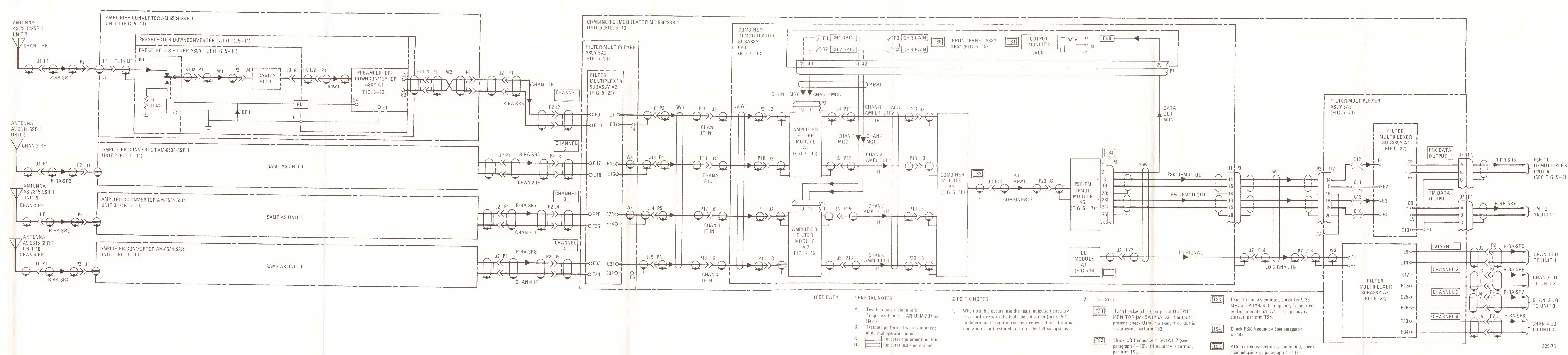
162.422

Figure 2-7.—Functional signal flow diagram.

REF DES	ZONE		REF DES	ZONE
R·RA·SR5	5H		5A1A6W1P1	18
R·RA·SR6	5F		5A1A6W1P2	12
R·RA·SR7	5D		5A1A6W1P3	11
R·RA·SR8	5C		5A1A6W1P7	11
			5A1A6A1CR1	14
1J2	4H			
1W2P1	4H		5A1A6A1J1	11
1A1A1	3H		5A1A6A1R1	14
1A1FL1FL1	2G		5A1A6A1R2	13
1A1FL1J1	4H		5A1A6A1R3	13
			5A1A6A1R4	12
1A1FL1K1	1G			
2J2	4F		5A1A6A1S3	16
2W2P1	4F		5A1A6A1S4	1E
2A1A1	3F		5A1A6A1S5	1E
2A1FL1FL1	2E		5A1A6A1S6	1E
			5A1A6A1W1	12
2A1FL1J1	4F			
2A1FL1K1	1E		5A1A6A1A1	14
3J2	4D		5A1PS1J1	1E
3W2P1	4D		5A2	8I
3A1A1	3E		5A2J2	6I
			5A2J3	6I
3A1FL1FL1	2D			
3A1FL1J1	4D		5A2J4	6I
3A1FL1K1	1D		5A2J5	6I
4J2	4C		5A2J12	8I
4W2P1	4C		5A2A2	7I
4A1A1	3C			
4A1FL1FL1	2B			
4A1FL1J1	4C			
4A1FL1K1	1B			
5W1	9H			
5W1P2	9H			
5W1P9	10H			
5A1A2J1	11B			
5A1A3J1	12A			
5A1A6W1	11H, 12B, 17H			

ZONE
40, 14D
9D
8A
8B
8A
8B
9C
5D, 9D
7B
7C
19D
19C
18C
18D
18C
19D
17D
18D
18C

GENERAL NOTES

A. ☐ Indicated equipment marking

B. All NORM·OFF·RLY switches are shown set for normal system operation (NORM position).

C. A current path for energizing the CHANNEL DISABLED indicator is present when any NORM·OFF·RLY switch is set to RLY.

D. All relays are shown with the coils de·energized (normal system operation).

SPECIFIC NOTES

1. Voltage is present at E1, E2, E3, and E4 only when applicable NORM·OFF·RLY switch is set to RLY.

2. Voltage is present only when applicable NORM·OFF·RLY switch is set to RLY.

3. For ground path of relay coil terminal 2, see schematic diagram (figure 5·11).

4. 50·ohm resistor is part of relay.
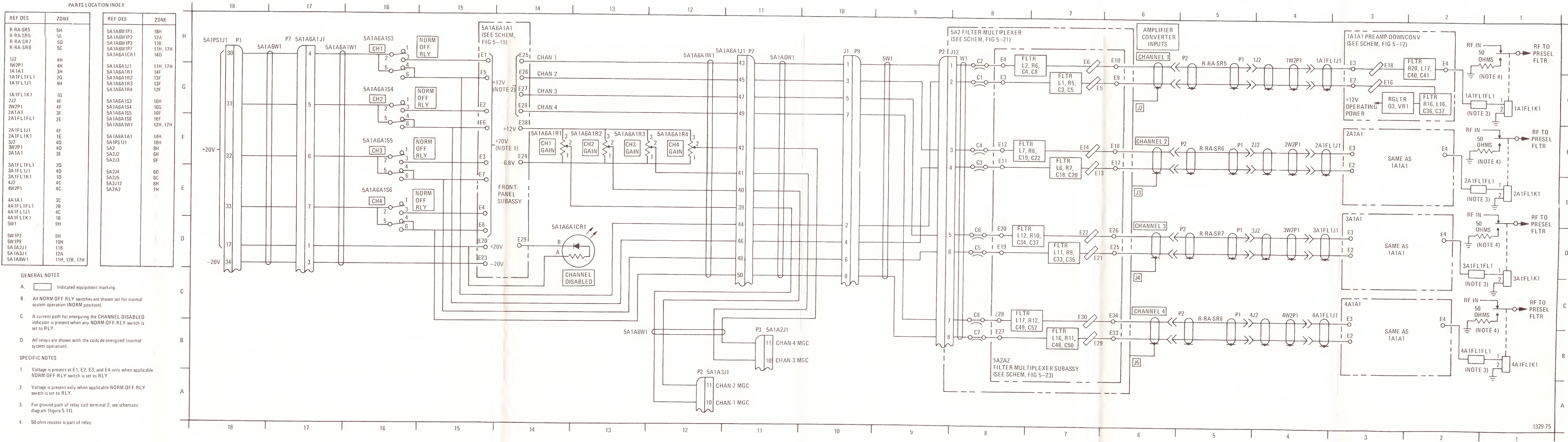
Figure 2-8.—Control diagram.

162.423

Indicates equipment marking.

SPECIFIC NOTES

1   When the equipment is shipped, the AC PWR circuit breakers are
    wired for operation with 115-volt AC input power. If 230-volt
    AC power is to be used, rewiring is necessary (see tables 8-1 and 8-2).

2. When the equipment is shipped, the 115/230-volt AC power control
    is wired for operation with 115-volt AC input power. Spare power
    supplies are wired in the same manner. If 230-volt AC power is to be
    used, rewiring is necessary (see tables 8-1 and 8-2)

PARTS LOCATION INDEX

REF DES	ZONE
R-RP-SR 1	19G
R-RP-SR-2	19D
5W1	17G
5W1P1	17G
5W1P8	16G
5A1J2	16G
5A1A6W1	5G, 10G, 15G
5A1A6W1P1	5G, 9G
5A1A6W1P8	4G, 11G, 14G
5A1A6A1	3H, 14H
5A1A6A1C81	13G
5A1A6A1DS1	1G
5A1A6A1E2	3F, 13F
5A1A6A1J2	4G, 11G, 14G
5A1A6A1M1	3G
5A1A6A1W2	4G, 14G
5A1PS1	9H
5A1PS1E1	8E
5A1PS1E2	8F
5A1PS1E3	7E
5A1PS1E4	7F
5A1PS1E5	9F

REF DES	ZONE
5A1PS1J1	5G, 9G
5A1PS1T1	7G
5A1PS1T2	7E
5A2	19H
5A2E3	19F
5A2E6	18F
5A2FL1	18G
5A2FL2	18G
5A2J1	19G
5A2J9	17G
5A2L1	18G
5A2L2	18G
6W1	17D
6W1P1	16D
6W1P3	17D
6A1J2	16D
6A1A5W1	5D, 10D, 15D
6A1A5W1P1	5D, 9D
6A1A5W1P7	4D, 11D, 14D
6A1A5A1	3E, 14E
6A1A5A1C81	13D
6A1A5A1DS1	1D
6A1A5A1E2	3C, 13C
6A1A5A1J2	4D, 11D, 14D
6A1A5A1M1	3C

REF DES	ZONE
6A1A5A1W2	4D, 14D
6A1PS1	9D
6A1PS1E1	8A
6A1PS1E2	88
6A1PS1E3	8A
6A1PS1E4	88
6A1PS1E5	9C
6A1PS1J1	5D, 9D
6A1PS1T1	78
6A1PS1T2	7C
6A2	19D
6A2E1	19C
6A2E6	18C
6A2FL1	18D
6A2FL2	18C
6A2J1	19D
6A2J6	17D
6A2L1	18D
6A2L2	18C
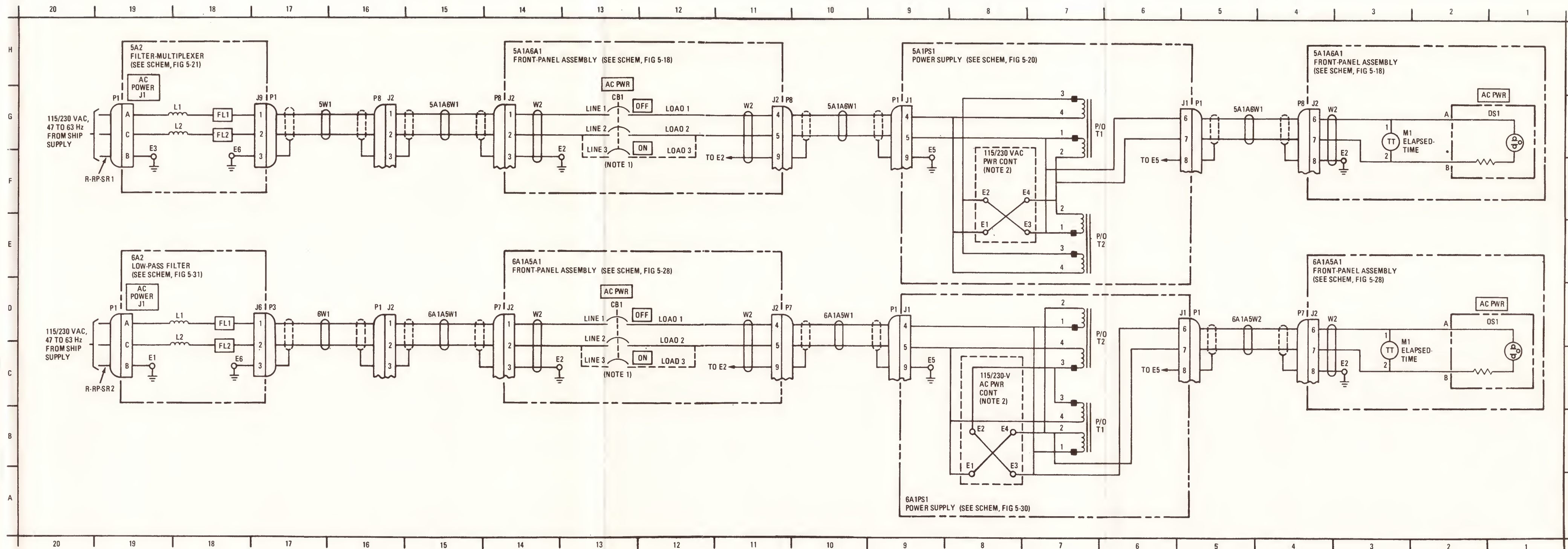
Figure 2-9.—Power distribution diagram.

GENERAL NOTE

☐ Indicates equipment marking.

SPECIFIC NOTES

1. When the equipment is shipped, the AC PWR circuit breakers are wired for operation with 115-volt AC input power. If 230-volt AC power is to be used, rewiring is necessary (see tables 8-1 and 8-2).

2. When the equipment is shipped, the 115/230-volt AC power control is wired for operation with 115-volt AC input power. Spare power supplies are wired in the same manner. If 230-volt AC power is to be used, rewiring is necessary (see tables 8-1 and 8-2).

PARTS LOCATION INDEX

REF DES	ZONE	REF DES	ZONE	REF DES	ZONE
R-RP-SR1	19G	5A1PS1J1	5G, 9G	6A1A5A1W2	4D, 14D
R-RP-SR-2	19D	5A1PS1T1	7G	6A1PS1	9D
		5A1PS1T2	7E	6A1PS1E1	8A
5W1	17G	5A2	19H	6A1PS1E2	8B
5W1P1	17G	5A2E3	19F	6A1PS1E3	8A
5W1P8	16G				
5A1J2	16G	5A2E6	18F	6A1PS1E4	8B
5A1A6W1	5G, 10G, 15G	5A2FL1	18G	6A1PS1E5	9C
		5A2FL2	18G	6A1PS1J1	5D, 9D
5A1A6W1P1	5G, 9G	5A2J9	19G	6A1PS1T1	7B
5A1A6W1P8	4G, 11G, 14G			6A1PS1T2	7C
5A1A6A1	3H, 14H	5A2L1	18G		
5A1A6A1CB1	13G	5A2L2	18G	6A2	19D
5A1A6A1DS1	1G	6W1	17D	6A2E1	19C
		6W1P1	16D	6A2E6	18C
5A1A6A1E2	3F, 13F	6W1P3	17D	6A2FL1	18D
5A1A6A1J2	4G, 11G, 14G			6A2FL2	18C
5A1A6A1M1	3G	6A1J2	16D		
5A1A6A1W2	4G, 14G	6A1A5W1	5D, 10D, 15D	6A2J1	19D
5A1PS1	9H	6A1A5W1P1	5D, 9D	6A2J6	17D
		6A1A5W1P7	4D, 11D, 14D	6A2L1	18D
5A1PS1E1	8E	6A1A5A1	3E, 14E	6A2L2	18C
5A1PS1E2	8F				
5A1PS1E3	7E	6A1A5A1CB1	13D		
5A1PS1E4	7F	6A1A5A1DS1	1D		
5A1PS1E5	9F	6A1A5A1E2	3C, 13C		
		6A1A5A1J2	4D, 11D, 14D		
		6A1A5A1M1	3C		

GENERAL NOTES:

A. Partial reference designations are shown. Complete reference designations include the prefix 1A1A1/ 2A1A1/3A1A1/4A1A1.

B. Unless indicated otherwise, all resistor power ratings are 1/4 watt and resistance values are in ohms ±5 percent; all capacitance values are in picofarads; all inductance values are in nanohenries; and all voltages are DC.

CAUTION

Use ohmmeter on highest usable scale to avoid damage to transistors

VOLTAGE CHART

	1	2	3	4
Q1	+8.7V	+6.3V	0V	GND
Q2	+10.8V	+6.3V	0V	GND
	E	B	C	
Q3	+12.7V	+13.4V	+15.3V	
	IN			
AR1	0V			
	1	3	4	5	6, 7
AR2	+10.9V	+6.5V	+3.3V	+3.3V	+2.7V
AR3	+11.6V	+6.9V	+3.6V	+3.6V	
	9	10			
AR2	+10.9V	+10.9V			
AR3	+11.6V	+11.6V			

All measurements are taken with high impedance probe (>1MΩ).
All measurements are within ±15 percent.

REF DES	ZONE	REF DES	ZONE	REF DES	ZONE
AR1	8G	C37	8B	L17	
AR2	8D	C38	8C	L18	3F
AR3	7D	C39	7C		
		C40	2A	P1	9G
CR1	7C	C41	1B		
				Q1	4F
C1	7G	E1	9D	Q2	5D
C2	7G	E2	1E	Q3	7C
C3	6G	E3	1F		
C4	6G	E4	1B	R1	4G
C5	6G	E5	7G	E	4G
C6	8F	E6	5G	R3	4F
C7	8F	E7	5G	R4	3G
C8	8F	E8	8F	R5	3F
C9	7F	E9	8F	R6	4D
C10	7F	E10	5F	R7	
C11	7F	E11	5F	R8	4E
C12	6F	E12	3F	R9	5E
C13	6F	E13	3F	R10	6D
C14	6F	E14	3D	R11	7D
C15	6F	E15	3D	R12	8D
C16	6F	E16	9C	R13	9E
C17	5F	E17	7C	R14	9E
C18	5F	E18	2B	R15	9D
C19	4G			R16	8C
C20	4F	L1	7G	R17	8C
C21	3G	L2	6G	R18	8C
C22	3F	L3	7F	R19	7C
C23	2F	L4	6F	R20	2B
C24	2F	L5	6F		
C25	2E	L6	5F	TP1	8C
C26	2D	L7	5F		
C27	4D	L8	4F	T1	3F
C28	4E	L9	3F	T2	3E
C29	5E	L10	3D	U1	9F
C30	6D	L11	4D	U1	9F
C31	6D	L12	5E		
C32	6E	L13	7E	VR1	8B
C33	8D	L14	7D		
C34	8D	L15	9E	W1	8G
C35	8E	L16	8C		
C36	9C	L17			
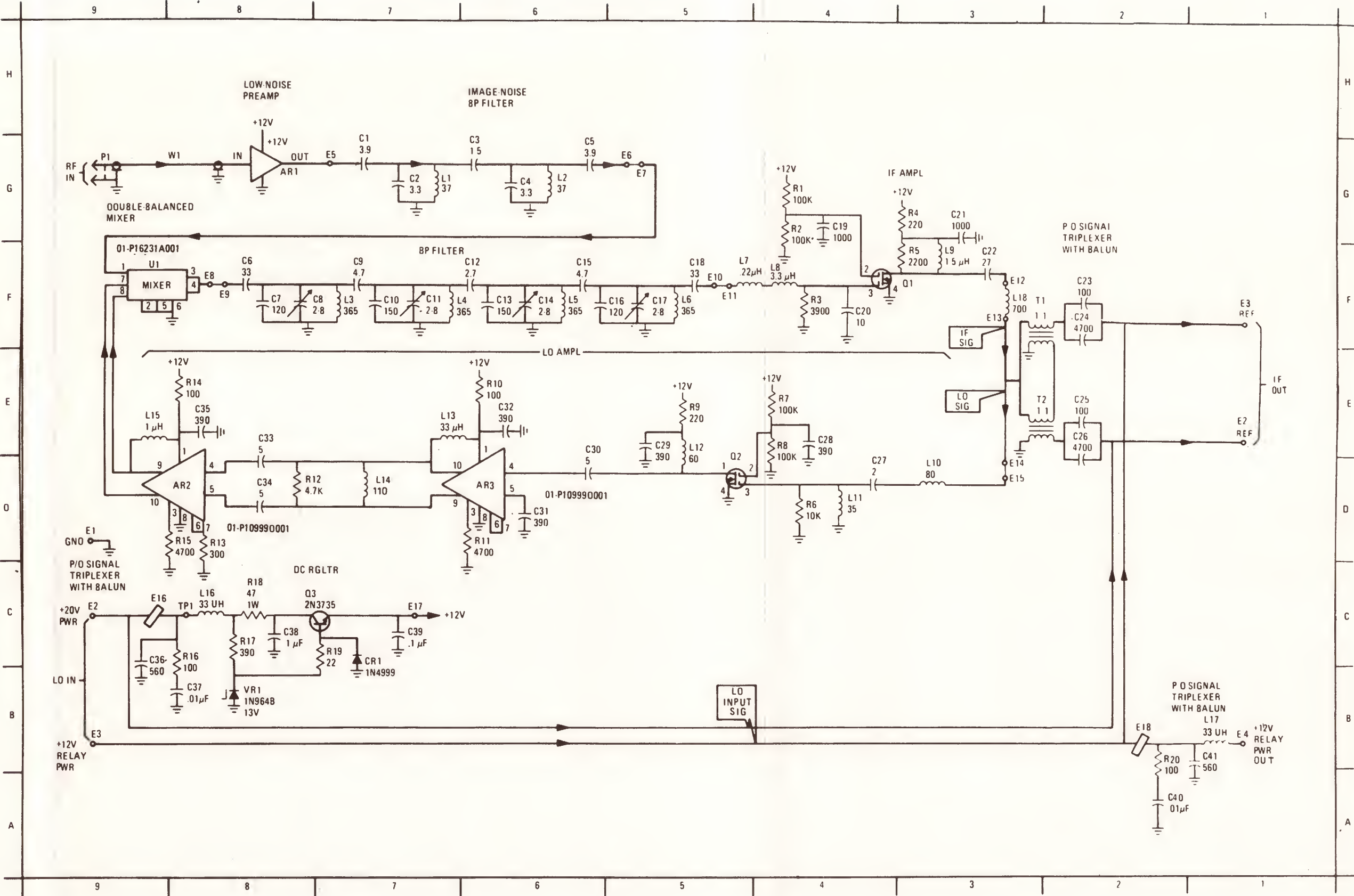
162.425

Figure 2-10.—Maintenance schematic diagram.

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...TER, SONAR

TO EMISSION MONITOR

SHIPS POWER 115VAC 60HZ, 1∅

JUNCTION BOX

UNIT 1 ID-1566/UQN-4 INDICATOR, DEPTH

8 REMOTE INDICATOR FUNCTION

DEPTH

| 1 | 9 | 8 | 4 |

POWER ON - OFF
POWER ON

F1   F2
LINE FUSES

LOST TRACKING

FEET / FATHOMS

XMTR FAULT   INDICATOR
XMTR FAULT

UNIT 1

4D LINES - DECIMAL DEPTH

COMMON

MAL
TH
RMATION
NES
EMOTE
CATORS
D - A
VERTERS

3D LINES - DECIMAL DEPTH

UNIT 1 CV-2465/UQN-4 CONVERTER, DIGITAL TO ANALOG

9 DIGITAL-TO ANALOG CONVERTER FUNCTION

| 1 | 9 | 8 | 4 |
LOST TRACKING

POWER ON - OFF
POWER ON

F1   F2
LINE FUSES

AUTO/MANUAL SELECTOR
MANUAL

MANUAL CONTROL

ILLUMINATION
MIN   MAX

COMMON

FEET

XMTR FAULT

LOST TRCK

REFERENCE VOLTAGE

SOS-26 SONAR

ANALOG DEPTH

SHIPS POWER 115VAC 400HZ, 1∅

HI
LO
COMMON

UNIT 1

ILLUMINATION
MIN   MAX

UNIT 1

162.429

Figure 2-12.—FOMM overall function diagram.

Column labels (vertical):
- 1A4A1 PIN 45/TP6 (TRK PULSE NO. 1)
- 1A4A1 PIN 41/TP6 (TRK PULSE NO. 2)
- 1A4A6 PIN 2-10 (RNG GATE XFER)
- 1A4A6 PIN 39/TP6 (RNG GATE XFER NO. 2)
- 1A4A9 PIN 41/TP6 (RNG GATE XFER NO. 2)
- 40 OUTPUT LINES
- DEPTH READOUT (6000 COUNT DELAY)
- REMOTE INDICATOR FUNCTION
- 1J1-A1/J1-C (115VAC, 60HZ)
- POWER ON
- (LOST TRACKING)
- (FELT)
- (FATHOMS)
- (XMTR FAULT)
- (DEPTH)
- 1A1-A1/J1-C (115VAC, 600HZ)
- J2-1/COMMON (REF)
- D-A CONVERTER FUNCTION
- POWER ON
- (PANEL ILLUMINATION)
- (MANUAL)
- (LOST TRACKING)
- (DEPTH READOUT)
- J2-E/COMMON (ANALOG OUTPUT)

Column numbers:
| 45 | 46 | 47 | 48 | 49 | 50 | 51 | SP-2 | 52 | 53 | 54 | 55 | 56 | 57 | SP-3 | 58 | 59 | 60 | 61 | 62 | 63 | 64 |

Row entries include: LIT, OUT, IND 1, IND 2, IND 3, A, A1, A2, A3

(Sidebar text, partially visible)

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162.432

Figure 2-13.—Maintenance dependency chart.

TOPIC 3

NAVY DIRECTIVES

TOPIC OVERVIEW

This topic describes the three types of Navy directives, and how to identify them. Following is an outline of the topic:

1. *DEPARTMENT OF THE NAVY DIRECTIVES ISSUANCE SYSTEM, SECNAVINST 5215.1*

   Defines the three types of Navy directives and describes the characteristics of each.

2. *DIRECTIVE IDENTIFICATION AND NUMBERING*

   Describes the numbering system used to identify Navy directives. Covers the function of each of the five parts of a directive's identification number.

NAVY DIRECTIVES

Directives are instructions, notices, or change transmittals. They do one or more of the following:

- Establish policy, organization, conduct, procedures, or methods.

- Require action or furnish information needed to operate and manage Navy activities.

- Provide authority or information that must be issued formally.

DEPARTMENT OF THE NAVY DIRECTIVES ISSUANCE SYSTEM, SECNAVINST 5215.1

In an organization as large as the Navy, communication among the various levels of command is important. SECNAVINST 5215.1 establishes a simple, uniform plan for issuing and maintaining Navy directives. There are three types of Navy directives: (1) instructions, (2) notices, and (3) change transmittals.

Instructions

An *instruction* is a directive that has continuing reference value, or requires continuing action that cannot be completed in less than 6 months. It is effective until the originator cancels or supersedes it. Figure 3-1 is a typical instruction.

Notices

A *notice* is a one-time or brief-natured directive that has a self-canceling provision. It has the same force and effect as an instruction, but usually

Figure 3-1.—A typical Navy instruction.

remains in effect for less than 6 months. It can never remain in effect for longer than 1 year.

A notice usually requires a specific action, such as submitting a report, using a form, or following a specified procedure. The required action is canceled when the notice is canceled unless the action is incorporated into another document, like an instruction. Figure 3-2 is a typical notice.

Change Transmittals

A *change transmittal* issues a change to an instruction or, under extenuating circumstances, a notice. Each change transmittal describes the nature of the changes it issues and gives directions for making them. A change transmittal

SELF-
CANCELLING
PROVISION

NOTICE
IDENTIFICATION
BLOCK

DIRECTIVE
DESIGNATION

REFERENCES
USED

PURPOSE
OF THE
NOTICE

BACKGROUND
INFORMATION

STATEMENT
OF POLICY,
SPECIFIC
REQUIREMENT

ACTION
EXPECTED

INFORMATION
REGARDING
CANCELLATION
OF RETENTION

WHO GETS
THIS
NOTICE

DEPARTMENT OF THE NAVY
NAVAL EDUCATION AND TRAINING PROGRAM
DEVELOPMENT CENTER
PENSACOLA, FLORIDA 32509

IN REPLY REFER TO

Canc frp: Jun 81
NAVOCEANCOM NOTICE 3140
Code W33
11 Dec 1980

NAVOCEANCOM NOTICE 3140

From: Commander Naval Oceanography Command

Subj: UNITS OF MEASURE USED IN NAVAL OCEANOGRAPHY COMMAND PRODUCTS;
POLICY CONCERNING

Ref: (a) NAVOCEANCOMINST 3140.1F

1. Purpose. To promulgate policy regarding units of measure (English, metric, etc.) in which NAVOCEANCOM products are provided.

2. Background. Previous governmental thrusts to adopt the metric system have caused some confusion regarding the preferred units in which NAVOCEANCOM environmental support products are stated. This confusion was noted at a recent command operations conference and resulted in the following policy statement.

3. Policy. NAVOCEANCOM activities will provide information, support products and services only in those units of measure used by the fleet (or Navy shore activities, as appropriate) in order to avoid confusion and the need for tables and charts for conversion.

4. Action. NAVOCEANCOM activities will comply with the policy stated above.

5. Cancellation. This notice may be retained after cancellation until the above policy is included in a revision of reference (a).

J. R. McDONNELE

Distribution:

C40   Naval Oceanography Command Detachments

FD   Naval Oceanography Command Shore Activities

Figure 3-2.—A typical Navy notice.

CHANGE
TRANSMITTAL
IDENTIFICATION
BLOCK

DIRECTIVE
DESIGNATION

PURPOSE OF
THE
TRANSMITTAL

ACTION
EXPECTED

WHO GETS
THIS CHANGE
TRANSMITTAL

WHERE THIS
CHANGE
TRANSMITTAL
IS STOCKED

DEPARTMENT OF THE NAVY
NAVAL EDUCATION AND TRAINING PROGRAM
DEVELOPMENT CENTER
PENSACOLA, FLORIDA 32509

IN REPLY REFER TO:
NSGINST 7132.1H CH-1
GD5/0348
16 Oct 1987

NAVSECGRU INSTRUCTION 7132.1H CHANGE TRANSMITTAL 1

From: Commander, Naval Security Group Command

Subj: NAVAL SECURITY GROUP O&MN (OPERATION AND MAINTENANCE, NAVY) OPERATING
BUDGET STATUS AND UNFUNDED DEFICIENCIES

1. Purpose. To transmit change 1 to the basic instruction.

2. Action. Make the following pen and ink changes:

a. Paragraph 3f, second sentence, change to read "With the exception of
Sub-Activity groups (SAGs) GE (Signal Security), GF (Fleet Electronic Command
and Control) GJ (Maintenance and Repair of Real Property and GK (Minor
Construction and Alteration), there are no restrictions on the redistribution
of budgeted funds within or among SAGs within the same appropriation subhead
(.6920 or .6930); however, funds cannot be transferred from one subhead to
another."

b. Add paragraph 3k as follows:

"k. It is the Navy policy to limit minor construction expenditures
(SAG GK) to 10 percent or less of Maintenance of Real Property (SAG GJ). It
is recognized that security, safety or mission requirements could occasionally
require abnormally high expenditures in SAG GK. Unusual construction
requirements should be identified in the budget process. Construction
expenditures exceeding 10 percent or higher shall not be executed without
prior approval from this Headquarters."

S. W. JACOBS
Deputy

Distribution:
NAVSECGRU List XI

Copy to:
NAVSECGRUDET Crane (2)
NAVEDTRAPRODEVCENCORDIV Pensacola

Stocked at:
Commanding Officer
Naval Security Station
Directives Control (113)
3801 Nebraska Avenue, NW
Washington, DC 20393-5210

Figure 3-3.—A typical Navy change transmittal.

is canceled after the appropriate action is completed. Figure 3-3 is a typical change transmittal.

DIRECTIVE IDENTIFICATION AND NUMBERING

Each originating office identifies its directives by:

(1) the originator's abbreviation;
(2) the type of directive;
(3) the subject identification number;
(4) a consecutive number, preceded by a decimal point (for instructions only); and
(5) an alphabetic suffix (for revisions to an instruction).

For example:

(1)	(2)	(3)	(4)	(5)
SECNAV	INSTRUCTION	5215	.1	A

(Shortened, this reads SECNAVINST 5215.1A.)

Each directive has a subject identification number from the *Department of the Navy File Maintenance Procedures and Standard Subject Identification Codes (SSIC)*, SECNAVINST 5210.11 (often called the *SSIC Manual*). This manual outlines the process to identify, arrange, file, and reference Navy and Marine Corps documents by subject.

When instructions are classified, their subject identification numbers are prefixed by a "C" for Confidential and an "S" for Secret. (For example, SECNAVINST C5215.1A would be a Confidential instruction).

SUMMARY

Various levels of command establish operating policies and procedures. To effectively communicate these policies and procedures, they issue directives. Directives can be either long-lasting *instructions*, short-term *notices*, or *change transmittals*. Directives inform everyone of exactly what they're responsible for doing and when they're expected to do it.

REFERENCES

Directives Issuance System, SECNAVINST 5215.1, Chief of Naval Operations, Washington, DC, 1970.

Department of the Navy File Maintenance Procedures and Standard Subject Identification Codes, SECNAVINST 5210.11, Chief of Naval Operations, Washinton, DC, 1982.

TOPIC 4

DRAWINGS AND BLUEPRINTS

TOPIC OVERVIEW

Drawings and blueprints are all around you. The floor plan of your shop, the block diagram of a digital computer, the schematic diagram of a receiver; all of these are examples of drawings and blueprints you'll frequently use. In this topic, you will learn how to identify and handle them. Following is an outline of the topic:

1. DRAWING AND BLUEPRINT IDENTIFICATION

   Describes how to locate and interpret the various parts of military drawings and blueprints. Defines terms and symbols used in each part.

2. ELECTRICAL AND ELECTRONICS BLUEPRINTS

   Describes the functions and purposes of the five types of electrical and electronics blueprints commonly used by CTMs.

3. AS-BUILT INSTALLATION DRAWINGS

   Describes the purpose and contents of this type of drawing.

4. HANDLING BLUEPRINTS

   Describes the procedures for proper handling and storage of blueprints.

DRAWING AND BLUEPRINT IDENTIFICATION

Drawings include a broad range of diagrams, schematics, and building plans. The type you'll use most often is the schematic drawing. Schematics are in technical manuals and other electronics information references like station drawings and installation plans. *Blueprints* are simply reproduced copies of drawings. The following paragraphs contain general information on the data you'll find on drawings and blueprints.

Drawings and blueprints are prepared to meet established Military Standards (MIL-STDS). These MIL-STDS are listed in the *Department of Defense Index of Specifications and Standards*, issued 31 July of each year.

Table 4-1.—Common Drawing and Blueprint Standards

NUMBER	TITLE
DOD-STD-100C	*Engineering Drawing Practices*
ANSI Y14.5M-82	*Dimensioning and Tolerancing*
ANSI Y14.6-78	*Screw Thread Representation*
MIL-STD-12D	*Abbreviations for Use on Drawings*
MIL-STD-14A	*Architectural Symbols*
IEEE STD 315-75	*Graphic Symbols for Electrical and Electronics Diagrams*
MIL-STD-15 Part 2	*Electrical Wiring Equipment Symbols for Ships Plans, Part 2*
ANSI STD Y32.9-72	*Electrical Wiring Symbols for Architectural and Electrical Layouts*
IEEE STD 200-75	*Reference Designations for Electrical and Electronics Parts and Equipment*
MIL-STD-17B Part 1	*Mechanical Symbols*

Table 4-1 lists, by number and title, common MIL-STDS on drawings and blueprints that you'll use.

PARTS OF MILITARY DRAWINGS AND BLUEPRINTS

The parts of a military drawing are

- Title block
- Drawing number
- Scale
- Revision block
- Part numbers
- Zone numbers
- Bill of material
- Application block
- Notes and specifications
- Legend

A

N N DWG NO. **OIOI 46**	**NEWPORT NEWS SHIPBUILDING & DRY DOCK CO.** **NEWPORT NEWS, VIRGINIA** FSCM NO. 43689 HULL DESIGN DIV STRUCTURAL DEPT

DRAWN *H.E. Baker*
CHECKED *R.F. Cronin*
SUPVR *L. Hanley*
DATE *5/11/68*
EXAMINED
E.W. TAYLOR
DATE COMPLETED *5/17/68*
AUTHORIZED

TITLE
AIRCRAFT CARRIER CVAN 68
DOUBLE BOTTOM
AFT OF FRAME 180
COMPARTMENT & ACCESS.

APPROVED *D.E. Clark* DATE **JUL 17 1968**
FOR SUPERVISOR OF SHIPBUILDING USN

TYPE OF DWG	SIZE	CODE IDENT NO.	NAVSHIP SYSTEM COMMAND NO.	REV.
WORKING DRAWING	H	80064	800	2647537	A

SCALE   ⅛ = 1 FT.   SHEET ___1___ OF ___1___

A

B

DES. *R. HATHAWAY*
DRWN. *R. HATHAWAY*
CHK. *B.W. Duck*
SUPV. *T.A. Barrett*
IN CHARGE *E. GRANT*

SATISFACTORY TO
W.A. Johnson

APPROVED   DATE *5/17/68*
J.R. Jones
OFFICER IN CHARGE

APPROVED   DATE *5/12/68*
John G. Hayes
PUBLIC WORKS OFFICER

DEPARTMENT OF THE NAVY   NAVAL FACILITIES ENGINEERING COMMAND
U.S. NAVAL STATION, WASHINGTON, D.C.

INSTALLATION OF NEW LIGHTING
BLDG. 220-3 & 4
WASHINGTON NAVY YARD

CODE IDENT. NO.	SIZE	FEC DRAWING NO.
80091	F	1167420

| SCALE ⅛ = 1' | SPEC. 82805/68 NBy 82805 | SHEET 1 OF 1 |

B

Figure 4-1.—Examples of a blueprint title block.

Title Block

The *title block* contains the *drawing number*, the *scale*, the *name of the part or assembly that the blueprint represents*, and any other information required to identify the part or assembly. It is located in the lower right-hand corner of all drawings and blueprints.

Example 1 of figure 4-1 is a NAVSEASYSCOM title block. Example 2 of figure 4-1 is a title block used by Naval Facilities Engineering Command (NAVFACENGCOM) or Space and Warfare Systems Command (SPAWARSYSCOM).

Title blocks also include the name and address of the government agency or organization preparing the drawing, the drafting record, the authentication, and the date of approval.

A title block having a blank space with a diagonal or slant line drawn across it indicates that the information usually in that space is either not required or is given elsewhere on the drawing. A revised drawing is identified in the title block by adding a letter to the original number, as shown in example 1 of figure 4-1. This blueprint was revised, so the letter "A" appears in the appropriate space in the title block.

Drawing Number

All Navy drawings and blueprints are identified by drawing numbers. The number normally appears in the title block, as shown in figure 4-1, but it can also be in other places on the drawing. It can be near the top border line in the upper corner, or on the back side at both ends so the number is visible when the drawing is rolled up.

If a drawing has more than one sheet, the sheet number and number of sheets in the series is noted in the title block. For example, note that in the title blocks in figure 4-1, the sheet is labeled "sheet 1 of 1."

Scale

The *scale* of a drawing is in or near the title block. It gives the size of the drawing, as compared with the actual size of the part. The scale may be a ratio, such as 1" = 2", 1" = 12", and 1/2" = 1'. Or, it may be stated as full size, one-half size, one-fourth size, and so forth.

If the scale of a blueprint is 1" = 2", this means each line on the print is reduced to one-half its actual size. If the scale is 3" = 1", each line on the print is enlarged three times its actual size. Very small parts are enlarged on drawings for clarity. Large objects are normally reduced in size to fit on standard-size drawing paper.

Remember: NEVER MEASURE A DRAWING; USE THE DIMENSIONS!

Always use dimensions, because the print may have been reduced in size from the original drawing, or you might not take the scale of the drawing into consideration. Also, paper stretches and shrinks as the humidity changes. The greatest source of error is in actually taking a measurement by laying a rule on the print itself. Play it safe and READ the dimensions on the drawing.

Some drawings, such as maps, use graphic scales of the number of feet or miles represented by an inch on the drawing. This is often stated in fractions, such as 1/500. This means that one unit on the map is equal to 500 like units on the ground. A large-scale map has a scale of 1" = 10'; a map with a scale of 1" = 1000' is considered to be a small-scale map.

Various types and shapes of scales are used in preparing drawings. Figure 4-2 shows four common types of scales: *architect*, *engineer*, *metric*, and *graphic*.

Architect scales are divided into proportional feet and inches. See view A of figure 4-2. They are generally used in scaling drawings for machine and structural work. The triangular architect scale usually contains 11 scales, each subdivided differently. Six scales read from the left end, while five scales read from the right end. View A of figure 4-2 shows how the 3/16" subdivision of the architect scale is further subdivided into 12 equal parts, representing 1" each. The 3/32" is subdivided into 6 equal parts, representing 2" each.

Engineer scales are divided into decimal graduations (10, 20, 30, 40, 50, and 60 divisions to the inch). See view B of figure 4-2. These scales
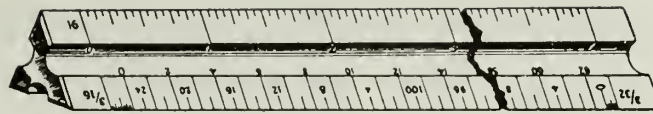
A

ARCHITECT SCALE
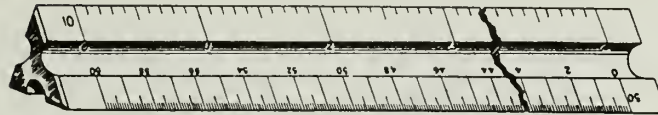
B

ENGINEER SCALE
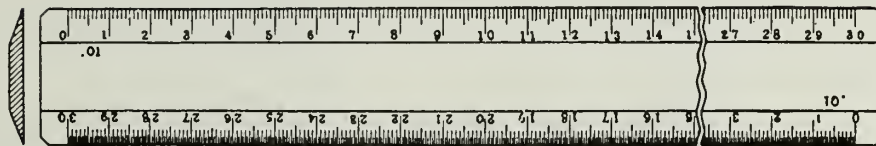
C

METRIC SCALE
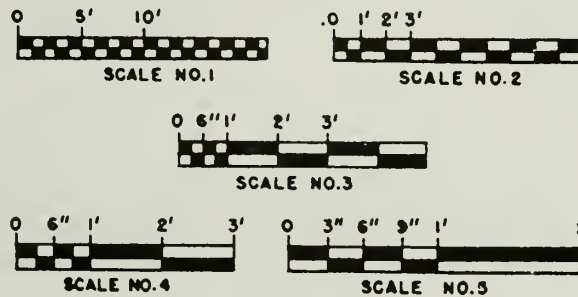
D

GRAPHIC SCALES

Figure 4-2.—Types of scales.

are used for plotting and map drawing and in the graphic solution of problems.

Metric scales are for drawings and maps that use the metric system. See view C of figure 4-2. The metric scale is divided into centimeters and millimeters.

To convert centimeters to inches:
2.54 centimeters (cm) equals 1 inch.

BILL OF MATERIAL

ITEM NO.	DESCRIPTION	UNIT	ASSEMBLY OR FSN NO.	QUANTITIES	
				TROP	NORTH
3 – 1	LIGHTING CIRCUIT — NAVFAC DWG NO. 283414	EA.	3016	3	3
3 – 2	POWER BUS, 100A — NAVFAC DWG NO 504131	EA	3047	1	1
3 – 3	RECEPTACLE CKT — NAVFAC DWG NO 303668	EA	3019	2	2
3 – 4	BOX, RECEPTACLE W/CLAMP FOR NONMETALLIC SHEATH WIRE	EA	5325 – 102 – 604	5	5
3 – 5	LAMP ELECTRIC, MED BASE, INSIDE FROSTED, 200W, 120 V	EA	6240 – 180 – 314	6 0	6 0
3 – 6	PLUG: ATTACHMENT; 3 WIRE, 15 AMP, 125 V.	EA	5935 – 102 – 309	1 0	1 0
3 – 7	PLATE: BRASS, DUPLEX RECEPTACLE	EA	5325 – 600 – 101	5	5
3 – 8	RECEPTACLE, DUPLEX, 3 WIRE, 15 AMP, 125V.	EA	5.325 – 100 – 102	5	5
3 – 9	ROD, GROUND, 3/4 " x 10'-0"	EA	5306 – 200 – 180	1 2	1 2
3 – 10	WIRE, NO 2 1/C STRANDED, HARD DRAWN, BARE	LB	6145 – 134 – 200	5 2	5 2
3 – 11	SWITCH, SAFETY, 2 P, ST 30 AMP, 250 V, PLUG FUSE	EA	5930 – 142 – 401	2	2
3 – 12	CLAMP, GROUND ROD	EA	5209 – 100 – 101	1 5	1 5
3 – 13	SWITCH, SAFETY, 200 AMP, 250V, 3 P	EA	5930 – 201 – 903	1	1
3 – 14	FUSE, RENEWABLE, 200 AMP, 250 V	EA	5920 – 100 – 000	6	6
3 – 15	LINK, FUSE, 200 AMP, 250 V	EA	5920 – 100 – 001	6	6
	FUSE PLUG, 30 AMP, 125 V	EA	5920 – 100 – 102	1 2	1 2

Figure 4-3.—Bill of material.

Graphic scales are lines subdivided into distances corresponding to convenient units of length on the ground or of the object represented by the drawing. See view D of figure 4-2. You can find them in or near the title block of the drawing. Drawings that use graphic scales can be reduced or enlarged. Neither will affect the relationship of the scale to the drawing.

Revision Block

When a drawing is revised, a letter is added to the original drawing number as shown in figure 4-1. Also, a separate *revision block* is used. This block (not shown) is located in the upper right-hand corner of the drawing. Revisions

noted in this block are dated and identified by a letter and a brief description of the revision.

Part Number

The part number on a blueprint is used the same way it's used in equipment technical manuals. Each part number identifies a separate part of an equipment or assembly.

When a drawing is of only one part, the part number may be the drawing number. When more than one item is described on a drawing, unique identification of each item is provided by the addition of a dash and a suffix number (for example, part number 12345-6, is the sixth item of part number 12345.) A dash and a suffix number after a part number can also identify modified or improved parts.

Find numbers are also used to help you identify parts on drawings. These numbers are cross-referenced to a parts list that gives the part number and nomenclature.

On drawings where "left-handed" and "right-handed" parts are involved, the left-handed part is usually the one shown in the drawing. Above the title block, you may find a notation such as "159674 LH shown, 159674-1 RH opposite." This means that the part shown is the Left-Hand (LH) part, and the Right-Hand (RH) part is the mirror (reverse) image of the left-hand part. The suffix number after the LH part number (in this case, -1) identifies the RH part number.

Zone Numbers

Zone numbers on drawings serve the same purpose as the numbers and letters printed on borders of maps—they help you locate a particular point. To find a point, you mentally draw horizontal and vertical lines from these letters and numerals to the point where these lines intersect. Large drawings may use the same system to help you locate a particular part, section, or view.

Bill of Material

The bill of material block on a drawing or blueprint lists the required parts by the appropriate number and any required materials. It often includes a list of standard parts known as a *parts list* or a *schedule*. Standard parts are commonly used items, such as machine bolts, screws, turnbuckles, rivets, pipefittings, and valves. A bill of material for an electrical plan is shown in figure 4-3.

Application Block

The application block on a drawing is usually near the title block. It identifies, directly or by reference, the larger units to which the part or assembly

02-1236009-1	AN/WLQ-4 (v)
NEXT ASS'Y	USED ON
APPLICATION	

Figure 4-4.—Application block.

on the blueprint belongs. See figure 4-4. The NEXT ASS'Y column in this block shows the drawing number or model number of the equipment's next larger (or higher) assembly. The USED ON column shows the model number or equivalent designation of the assembled units.

Notes and Specifications

Drawings contain all the information about an item or part that can be presented graphically (that is, in a drawing). But, more information is required by supervisors, contractors, manufacturers, and craftsmen that is not adaptable to the graphic form. Such information is generally given as *notes* and *specifications* attached to the drawings.

Notes are placed on drawings to give additional information needed to clarify objects on the blueprint. Leader lines identify the object being noted.

Specifications are statements or documents that describe or list particulars, such as the terms of a contract, or the details of an item not shown on a blueprint or drawing. Federal specifications identify the characteristics of material and supplies used jointly by the Navy and other Government departments. The *DOD Index of Specifications and Standards* lists all Federal specifications used as purchase specifications.

Legend

A legend explains or defines special symbols or markings on a drawing. The legend is usually in the upper right-hand corner of a drawing below the revision block. Figure 4-5 shows a legend for an electrical plan.

ELECTRICAL AND ELECTRONICS BLUEPRINTS

You will use electrical and electronics blueprints whenever you install, maintain, or repair electrical and electronics equipments or systems. This section describes the following types of electrical and electronics blueprints:

- Pictorial wiring diagrams

- Wiring (connection) diagrams

- Schematic diagrams

- Block diagrams

- Single-line diagrams

LEGEND:

Symbol	Description
O₈	FLUORESCENT FIXTURE, 8 DENOTES
50	CIRCUIT NUMBER, #50 DENOTES TYPE
─#─	HOMERUN, 3 -#12 WIRE IN ½" CONDUIT UNLESS OTHERWISE NOTED, ¾" CONDUIT IN FLOOR
⊕	DUPLEX RECEPTACLE
S	SWITCH
S₃	3 WAY SWITCH
-----	CONDUIT IN FLOOR
──	CONDUIT IN CEILING
O No.11	OUTLET BOX, FIXTURE No. 11 TO BE INSTALLED
Ⓔ	EXIT LIGHT
Ⓕ	FLOOD LIGHT
⊠	FIRE ALARM SIREN
⊡	BELL - 4 INCH, 110 V. VIBRATING TYPE
Ⓒ	CLOCK OUTLET
Ⓣ	THERMOSTAT
JB	JUNCTION BOX
∞	FAN, TOILET ROOMS
⟨	MOTOR CONNECTION
▶	TELEPHONE OUTLET
⊕⊕ᵀᴹ	PLUG IN MOULDING
⊞	FIRE ALARM SWITCH 110V.
⊟	110V. PUSH BUTTON FOR BELLS

FIXTURE⁰	PLATE # (9 Y9)	WATTAGE
5	2	100 W
7	2	2-25 W
11	2 (WITH WALL SWITCH)	60 W
23	5	60 W
25	5	100 W
28	5	100 W
50	(SPEC.)	2-40 W
51	(SPEC.)	150 W

NOTE: SEE SPECIFICATIONS FOR DETAILED
INFORMATION ON LIGHTING FIXTURES

FLUORESCENT LIGHT DETAIL
NO SCALE
FIXTURE 50, 2 40W

SYMBOL	DESCRIPTION	DATE	APPROVAL
	REVISIONS		

DPW DRAWING NO. 54409

DEPARTMENT OF THE NAVY
DISTRICT PUBLIC WORKS OFFICE
5TH ND ROAFOLK, VA.
BUREAU OF YARDS & DOCKS

LAWRENCE D. CAMMACK
ARCHITECT   LEXINGTON, KY.

NAVAL RESERVE ELECTRONICS FACILITY
DANVILLE, KENTUCKY

ELECTRICAL PLAN
RISER DIAGRAM

SATISFACTORY TO _____

DATE _____
SUBMITTED BY. _____ L. D. CAMMACK ARCHITECT

DATE 10/22/58

APPROVED FOR BUREAU OF YARDS & DOCKS

APPROVED BUPO FOR CHIEF OF BUREAU

DATE JAN 20 1959

SCALE AS SHOWN   SPEC 20328/58

SHEET 3 OF 9   NO. 20328

Y & D DRAWING NO. 811709

Figure 4-5.—Blueprint legend.
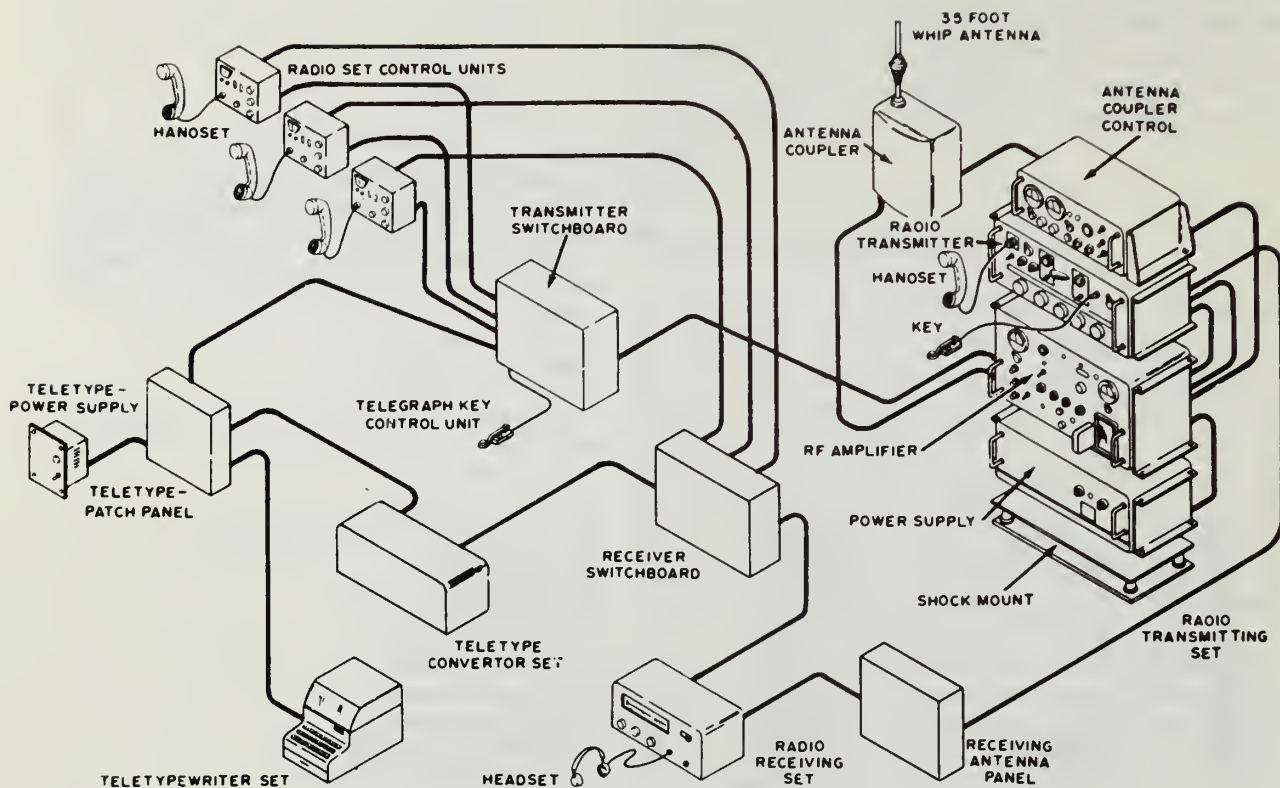
Figure 4-6.—Communications system pictorial wiring diagram.

Pictorial Wiring Diagrams

Pictorial wiring diagrams show the various parts of an equipment or system, and the connections between the parts. Figure 4-6 is an example of a pictorial wiring diagram.

Wiring (Connection) Diagrams

Wiring (connection) diagrams show individual connections within a unit and the physical arrangement of the components. Figure 4-7 is an example of a wiring (connection) diagram.

Schematic Diagrams

Schematic diagrams use graphic symbols to show how circuits function electrically. Refer to *Navy Electricity and Electronics Training Series*, Module 4, *Introduction to Electrical Conductors, Wiring Techniques, and Schematic Reading*, NAVEDTRA 172-04-00-85, for more information about schematics. Figure 4-8 is an example of a simplified schematic.

Block Diagrams

Block diagrams use squares, rectangles, or other geometric figures to represent the major components of an equipment or system. Lines
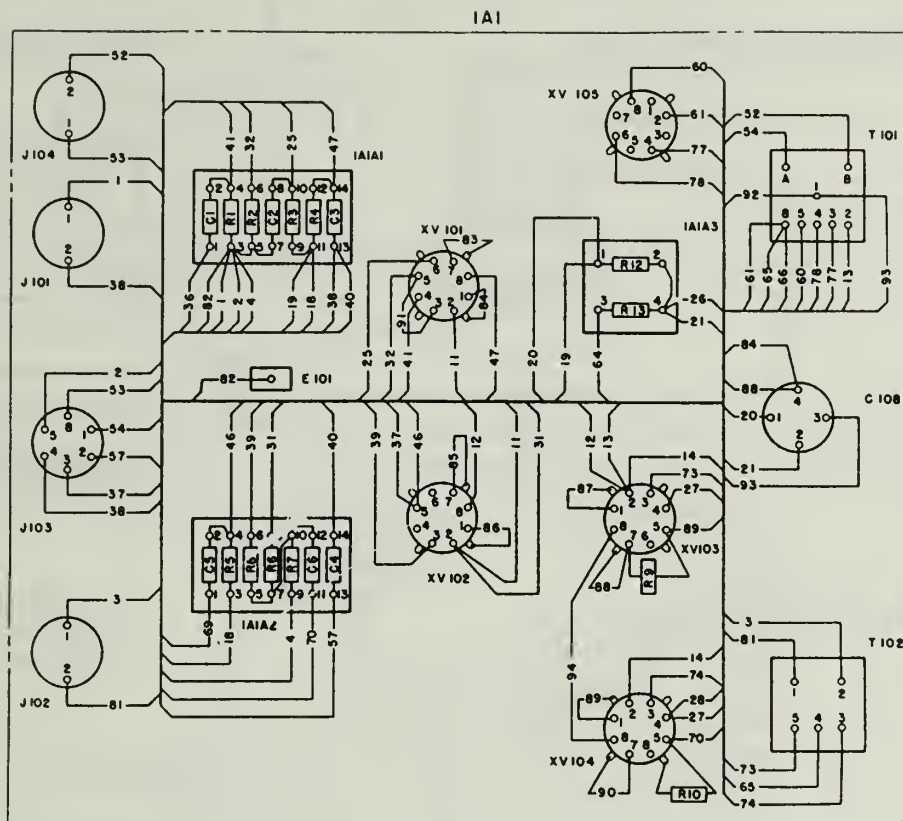
Figure 4-7.—Sample wiring diagram.
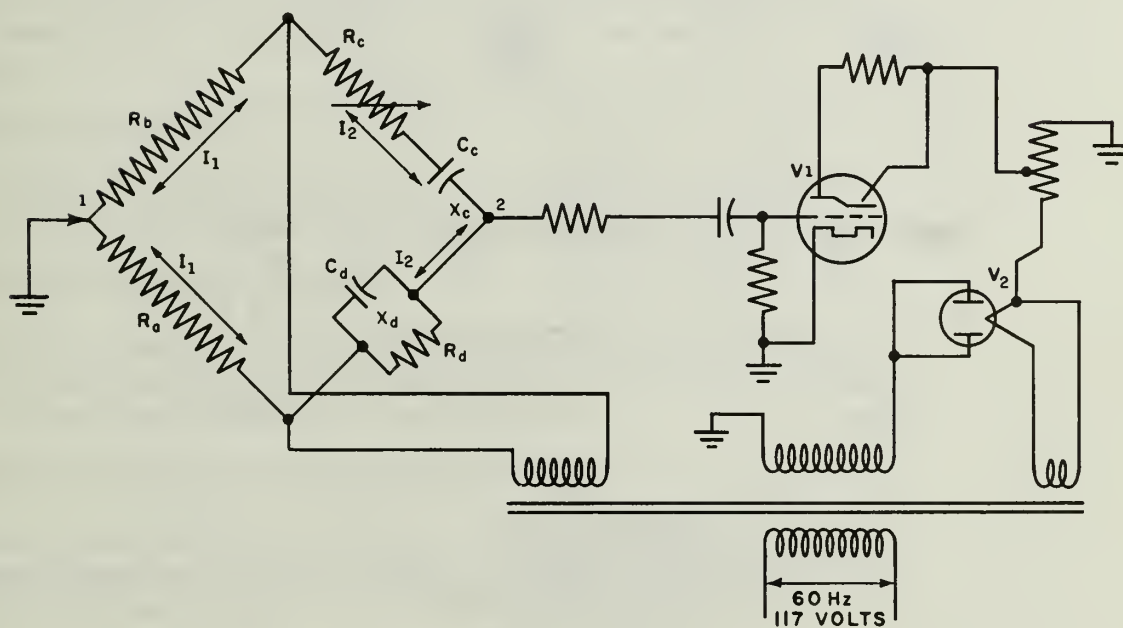
Figure 4-8.—Simplified schematic of a capacitance checker.
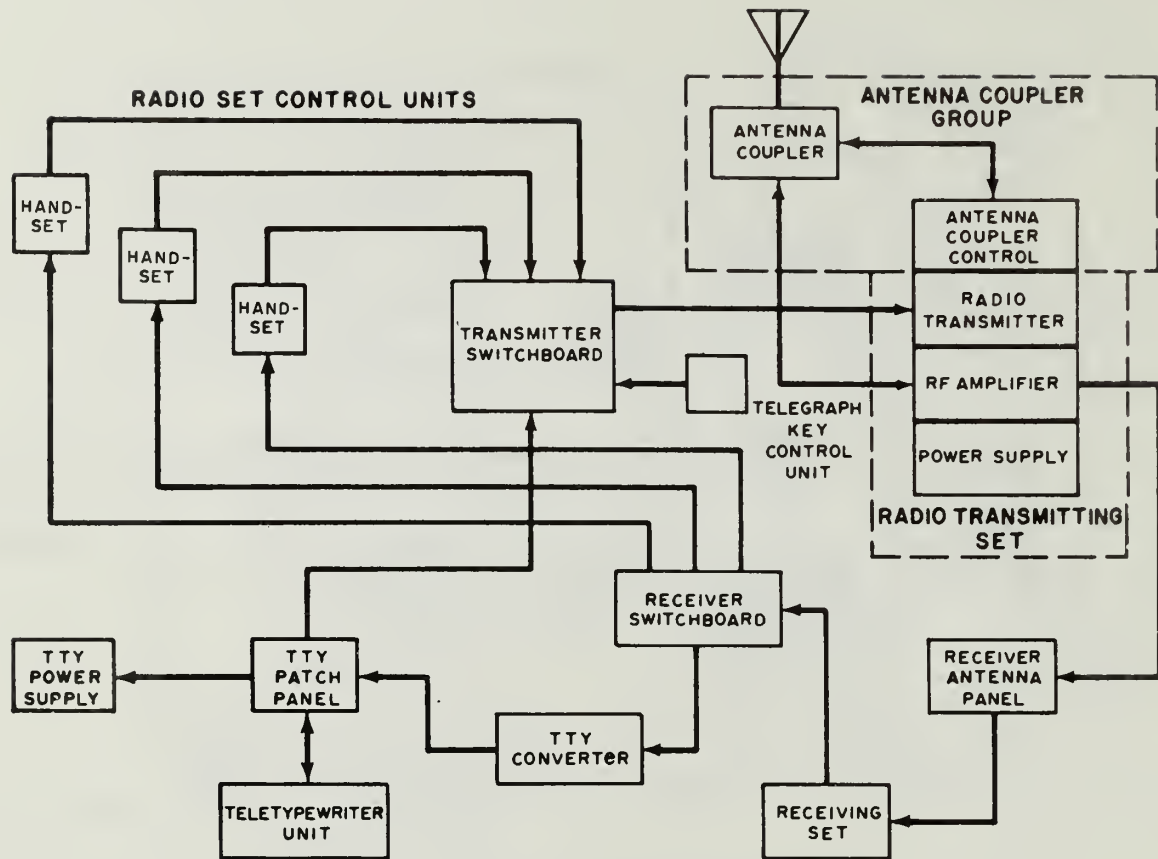
Figure 4-9.—Communications system block diagram.
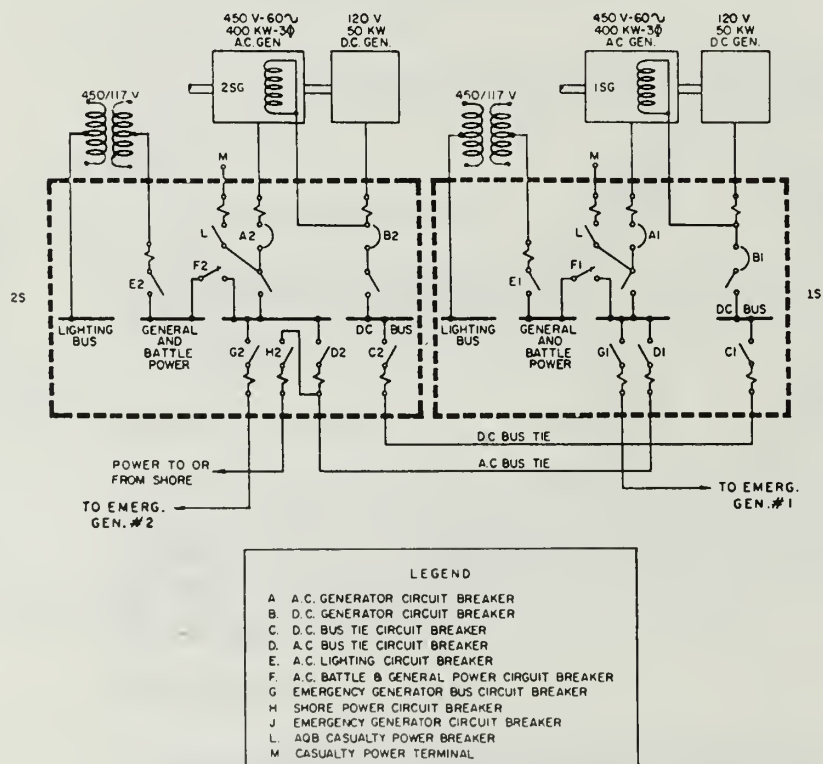
Figure 4-10.—Single-line diagram.
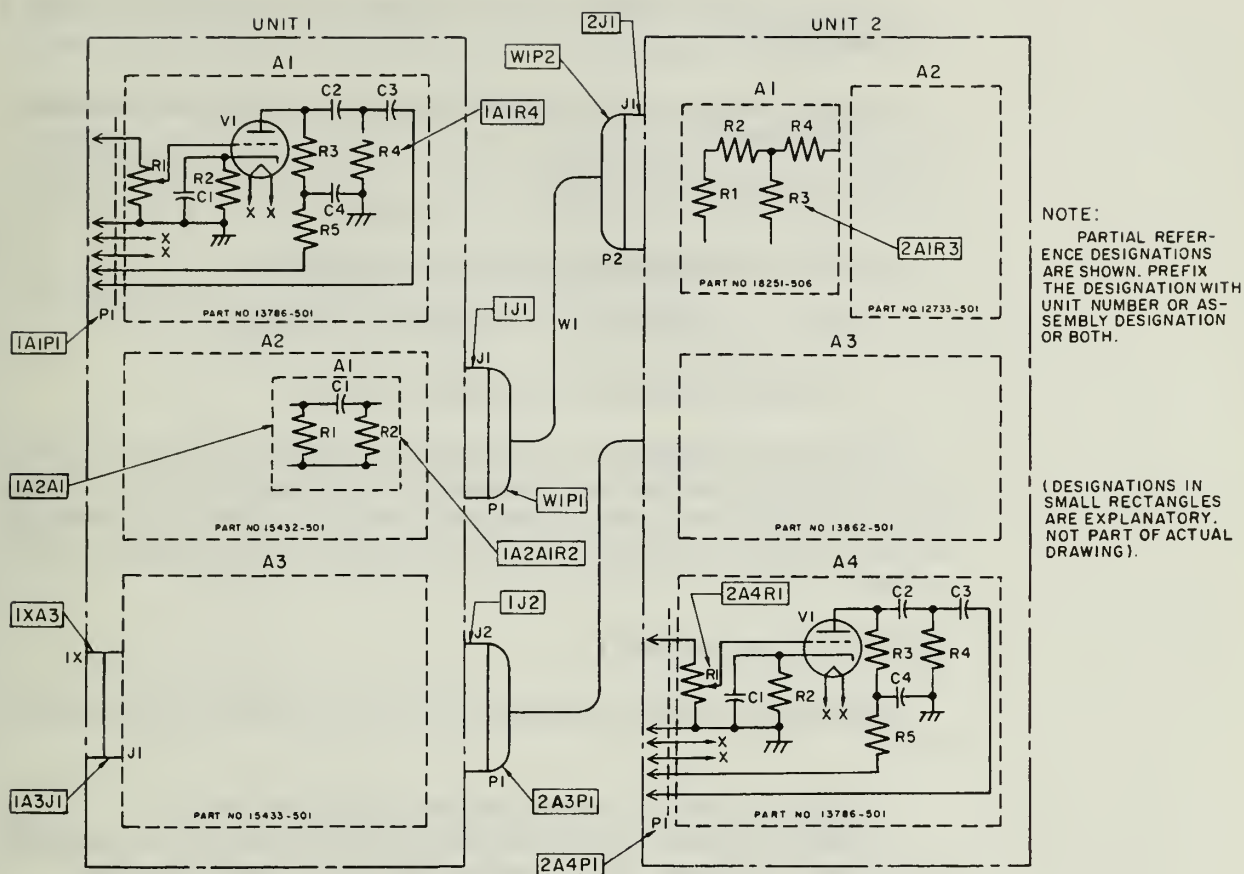
Figure 4-11.—Application of reference designators.

drawn between the blocks on the diagram show the interconnection relationship and order of signal or current flow. Figure 4-9 is an example of a block diagram.

Single-Line Diagrams

Single-line diagrams use single lines and graphic symbols to simplify a complex circuit or system. Figure 4-10 is an example of a single-line diagram.

REFERENCE DESIGNATORS

Reference designators are combinations of letters and numbers used to identify parts and components on electrical and electronics drawings. Figure 4-11 shows the application of reference designators.

AS-BUILT INSTALLATION DRAWINGS

Every Naval Security Group station keeps as-built installation drawings. These drawings illustrate the layout and provide data on a particular station. As-built drawings contain:

- Site topography data.

- Building floor plans, with room dimensions and usage information.

- Nomenclature, location, and functional interconnection of installed equipments.

- Radio-Frequency (RF) and Audio-Frequency (AF) distribution system block diagrams.

- Cross-connect schematics.

- Primary and emergency power system diagrams.

- Major operational systems and position pictorials.

- Communications circuit single-line drawings.

Equipment is identified on these drawings by its AN nomenclature or noun name. As-built drawings are prepared by the station's Electronic Field Activity (EFA). Some as-built drawings are major troubleshooting tools for analyzing system malfunctions when more than one equipment may be at fault.

HANDLING BLUEPRINTS

Blueprints are valuable permanent records. A few simple rules will preserve them:

1. Don't put them in strong sunlight, as they will fade.
2. Don't let them get wet or smudged with oil or grease. These ingredients seldom dry completely, thereby making the prints practically useless.
3. Don't make pencil or crayon notations on a print without proper authority. If you are instructed to mark a print, use an appropriate colored pencil, and make the markings a permanent part of the print. Yellow is commonly used for marking prints with blue backgrounds (blueprints).
4. Don't forget to put prints back into their correct file. By stowing them properly, you can find them when needed.

Most blueprints you use will be properly folded. However, some newly received blueprints may be unfolded or improperly folded. The method of folding blueprints depends upon the type and size of the identifying marks on the blueprints. Preferably, you fold blueprints with the identifying marks at the top when filing them vertically, and at the bottom right-hand corner when filing them horizontally. Construction blueprints are normally stored in rolls.

REFERENCES

Electronic Circuits Handbook, NAVSEA SE000-00-EIM-120, Naval Sea Systems Command, Washington, DC, December 1972.

Reference Data Handbook, NAVSEA SE000-00-EIM-140, Naval Sea Systems Command, Washington, DC, January 1972.

General Maintenance Handbook, NAVSEA SE000-00-EIM-160, Naval Sea Systems Command, Washington, DC, January 1981.

Blueprint Reading and Sketching, NAVEDTRA 10077-F, Naval Education and Training Program Development Center, Pensacola, FL, 1981.

Introduction to Electrical Conductors, Wiring Techniques, and Schematic Reading, Module 4, *Navy Electricity and Electronics Training Series*, NAVEDTRA 172-04-00-85, Naval Education and Training Program Development Center, Pensacola, FL, 1985.

DOD Index of Specifications and Standards, Department of Defense, Washington, DC, published annually as of 31 July.

APPENDIX I

CTM ADMINISTRATION

PUBLICATION AND INSTRUCTION REFERENCE LIST

The following publications and instructions will assist you in doing your job. Explanations of the ordering notes used in the list are at the end of this appendix.

TITLE	REFERENCE NUMBER	ORDERING NOTES
Abbreviations for Use on Drawings and in Specifications, Standards, and Technical Documents	MIL-STD-12-D	(3)
Afloat Shopping Guide (ASG)	NAVSUP 4400	
Section 1	FSG 20-49	0588-LP-460-1100
Section 2	FSG 51-56	0588-LP-460-1200
Section 3	FSG 59	0588-LP-460-1300
Section 4	FSG 61-73	0588-LP-460-1400
Section 5	FSG 75-84	0588-LP-460-1500
Section 6	FSG 91-99	0588-LP-460-1600
Afloat Supply Procedures	NAVSUP 485	0530-LP-485-0210
Bibliography for Advancement Study	NAVEDTRA 10052	0502-LP-050-2650
Commercial and Government Entity (CAGE) Code Handbook	DOD HBK H4/H8	0581-LP-004-2020
Consolidated Subject List	NAVPUBNOTE 5215	(2)
COSAL Use and Maintenance Manual	SPCCINST 4441.170	(1)
Deckplate	NAVSEASYSCOM Periodical T-0051-XX-DKP-XXX	(3)
Department of the Navy Directives Issuance System Consolidated Subject Index	NAVPUBNOTE 5215	(2)
Department of the Navy File Maintenance Procedures and Standard Subject Identification Codes (SSIC)	SECNAVINST 5210.11	(2)

TITLE	REFERENCE NUMBER	ORDERING NOTES
Department of the Navy Information and Personnel Security Program Regulation	OPNAVINST 5510.1	(2)
Department of the Navy Metrology and Calibration (METCAL) Program	SECNAVINST 4355.11	(2)
Disposal of Navy and Marine Corps Records	SECNAVINST 5212.5	(2)
Electric Shock, Its Cause and Prevention	None	0900-LP-007-9010
Electronics Installation and Maintenance Books (EIMB)	SE-000-00-EIM-XXX	(5)
Engineering Information Bulletin (EIB)	Complete set (all existing EIBs) NAVSEA S0111-XX-EIB-XXX	(5)
Enlisted Personnel Distribution Professional Bulletin (LINK)	NAVPERS 15980	(1)
Equipment Identification Code Master Index (EIC)	MSO 4790.E2579	AUTOVON 430-2793
FATHOM Surface Ship and Submarine Safety Review	None	AUTOVON 465-7449
FSC Groups and Classes: Part 1	DOD HBK H2-1	0581-LP-002-1075
FSC Numeric Index of Classes and Alphabetic Index, Part 2	DOD HBK H2-2	0581-LP-002-2080
GSA Supply Catalog	Mailing List Code OSSC-0001	(1)
Guide for User Maintenance of NAVSEA Technical Manuals	S005-AA-GYD-030/TMMP	0910-LP-007-4000
Installation Criteria for Shipboard Secure Electrical Information-Processing Systems	MIL-STD 1680B	(3)
Introduction to Federal Supply Catalogs and Related Publications	NAVSUP 4000	0588-LP-411-2000
List of Items Requiring Special Handling (LIRSH)	NAVSUP 4105	0588-LP-005-0035
List of Training Manuals and Correspondence Courses	NAVEDTRA 10061-AS	0502-LP-050-3096
Management Data List—Navy (ML—N)	NAVSUP 4100	0588-LP-411-1000

TITLE	REFERENCE NUMBER	ORDERING NOTES
Manual of Navy Enlisted Manpower Personnel Classifications and Occupational Standards	NAVPERS 18068E	
Section 1	NAVPERS 18068E	0500-LP-453-0085
Section 2	NAVPERS 18068E	0500-LP-453-0131
Manufacturer Designation Symbols	None	0967-LP-190-4010
Master Cross-Reference List (MCRL)		
Part 1	MCRL—N-1	0588-LP-002-1000
Part 2	MCRL—N-2	0588-LP-002-1500
Part 3	MCRL—N-3	0588-LP-002-1600
Master Index of Allowance Parts List (MIAPL)	None	AUTOVON 430-5160
Master Repairable Items List (MRIL)	NAVSUP 4107	0588-LP-410-2600
Metrology Automated System for Uniform Recall and Reporting (MEASURE) User's Manual	OPNAV 43P6A	AUTOVON 961-7816
Metrology Requirements List (METRL)	NA-17-35-MTL	
METRL		0817-LP-106-8270
METRL, Field Calibration Activity		0969-LP-133-2020
MILSTRIP/MILSTRAP Desk Guide	NAVSUP 409	0530-LP-409-0020
Naval Electronics Systems Command Metrology and Calibration Program	NAVELEXINST 9690.3	(2)
NAVSHIPS Technical Manual General Publications Index and User's Guide	S9096-AA-STM-010	0901-LP-001-0010 and (5)
Navy Stock List of Publications and Forms	NAVSUP 2002 (Microfiche)	0535-LP-004-0100
Nomenclature Assigned to Naval Electronic Equipment	None	
Volume 1	None	0967-LP-311-9010
Volume 2	None	0967-LP-311-9020
Publications Applicability List (PAL)	NAVSEA 4000-3 Ship-tailored from NAVSEAINST 4000.4	AUTOVON 360-4425
Safety Precautions Afloat	OPNAVINST 5100.19	(2)
Safetyline (A Professional Shore Safety Bulletin)	NAVSAFECEN	AUTOVON 564-7558/ 564-7209

TITLE	REFERENCE NUMBER	ORDERING NOTES
Shipboard Antenna System		
Volume 1, *Fundamentals*		0967-LP-177-3010
Volume 3, *Communications and Couplers*		0967-LP-177-3030
Volume 4, *Testing and Maintenance*		0967-LP-177-3040
Volume 5, *Data Sheets*		0967-LP-177-3050
Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety	MIL-STD-1310	(3)
Shipboard Electromagnetic Shielding Practices Handbook	S9407-AB-HBK-010	0910-LP-047-6300
Ship's 3-M Manual	OPNAVINST 4790.4	(2)
Ship's Portable Electronics/Electrical Test Equipment Requirements List (SPETERL)	NAVSEA Code 06	AUTOVON 222-7747
Standard General-Purpose Electronic Test Equipment (GPETE)	MIL-STD-1364	(3)
Standard Organization and Regulations of the U.S. Navy	OPNAVINST 3120.32	(2)
Technical Manual Identification Numbering Systems (TMINS)	M0000-00-IDX-000/TMINS	0518-LP-000-0000
Uniform Material Movement Issue Priority Systems (UMMIPS)	OPNAVINST 4614.1	(2)

ORDERING NOTES

(1) Order from issuing activity/originator.
★ (2) Use NAVSUP 1205.
★ (3) Use DD-1425.
★ (4) Use DD-1358/1250.
(5) See NAVSUP 2002 for specific FSN.

★ See NAVSUP 2002 for further guidance for requisitioning publications.

APPENDIX II

ABBREVIATIONS AND ACRONYMS

A

ADP.—Automated Data Processing
AEMO.—Assistant Electronics Material Officer
ATE.—Automatic Test Equipment

B

BIT.—Built-in-Test
BITE.—Built-in-Test Equipment

C

CAGE.—Commercial and Government Entity
CE.—Compromising Emanations
CEIB.—Confidential EIB
cm.—centimeter
COMSEC.—Communications Security
CSN.—Circuit Symbol Number
CT.—Cryptologic Technician
CTA.—Cryptologic Technician (Administrative)
CTI.—Cryptologic Technician (Interpretive)
CTM.—Cryptologic Technician (Maintenance)
CTO.—Cryptologic Technician (Communication)
CTR.—Cryptologic Technician (Collection)
CTT.—Cryptologic Technician (Technical)

D

DIA.—Defense Intelligence Agency
DIAM.—Defense Intelligence Agency Manual
DOD.—Department of Defense

E

ECC.—Enlisted Correspondence Course
EFA.—Electronic Field Activity

EIB.—Engineering Information Bulletin
EIC.—Equipment Identification Code
EIMB.—Electronic Installation Maintenance Book
EMI.—Electromagnetic Interference
EMO.—Electronics Material Officer

F

FACS.—Facilities (usually refers to FACS Book, Facilities Book)
FCIG.—Field Change Identification Guide
FOMM.—Functionally Oriented Maintenance Manual

G

GPETE.—General-Purpose Electronic Test Equipment

H

HF.—High Frequency

L

LCPO.—Leading Chief Petty Officer
LF.—Low Frequency
LH.—Left Hand
LPO.—Leading Petty Officer

M

MDC.—Maintenance Dependency Chart
MDS.—Maintenance Data System
MF.—Medium Frequency
MIL-STD.—Military Standard

N

NAVEDTRA.—Naval Education and Training publication

NAVELEX.—Naval Electronic Systems Command (usually a publication)

NAVFACENGCOM.—Naval Facilities Engineering Command

NAVPERS.—Naval Personnel (usually a manual)

NAVSEA.—Naval Sea Systems Command (usually a publication)

NAVSEASYSCOM.—Naval Sea Systems Command

NAVSECGRU.—Naval Security Group

NAVSECGRUINST.—Naval Security Group Instruction

NEC.—Navy Enlisted Classification

NEETS.—Navy Electricity and Electronics Training Series

NESEA.—Naval Electronics Systems Engineering Activity

NETPMSA.—Naval Education and Training Program Management Support Activity

NRTC.—Nonresident Training Course

NSGTP.—Naval Security Group Training Publication

NSN.—National Stock Number

O

OCC.—Officer Correspondence Course

OJT.—On-the-Job Training

OPNAVINST.—Chief of Naval Operations Instruction

P

PMS.—Planned Maintenance System

R

RADIAC.—Radioactivity Detection Indication and Computation

REFDES.—Reference Designation

RH.—Right Hand

S

SCI.—Sensitive Compartmented Information

SECNAVINST.—Secretary of the Navy Instruction

SPAWARSYSCOM.—Space and Naval Warfare Systems Command

SPETE.—Special-Purpose Electronic Test Equipment

T

TAMS.—Test and Monitoring Systems

V

VLF.—Very-Low Frequency

INDEX